MACHINE TOOL BLUE BOOK

OCTOBER 1942

Mitering a structural angle iron—with a MARVEL No. 8. The blade is fed into the work. Work is held stationary on the bed in quick action vise.

MARVEL SAWS

Shipbuilding calls for Universal tools

There's a lot of sawing—cutting-off, miterin notching and special cuts wherever ships are bei built, and work comes in all sizes, too. That's w you'll find MARVEL No. 8 Metal Cutting Ba Saws in shipyards and Navy yards, as well as tool rooms and die shops.

The MARVEL No. 8 is the most universal sa ing machine built. It will snip off ⅛" drill rod cut off an 18"x18" structural shape with equ efficiency, or will save hours of machining by roug ing work to size and shape. It will cut at any a gle from 45° right to 45° left, has a large "T slotted table (for holding irregular shapes, sp cial fixtures, etc.) and both power and hand feed It is a busy machine wherever found, for it does many different jobs and does each one well.

ARMSTRONG-BLUM MFG. CO. *"The Hack Saw People*
5700 Bloomingdale Ave. **Chicago, U. S. A**

Eastern Sales Office: 225 Lafayette St., New York

The Speed Features

HOBART ARC WELDERS are step-ng up America's production offensive

Hobart Speed Features are not attachments or devices . . . they're inherent in Hobart quality and design; engineered through years of research.

Simplified Control is a result of an attempt to build the welder to meet the operator's demands. An extremely important factor today.

Remote Control lets the operator do a top-notch job any distance from machine. A great aid to speed and efficiency.

Polarity Control by a mere flip of a switch. Simple, but positive. It's certainly a distinct advantage.

Cool Under Continuous Operation. Unusual ventilation principle lets three shifts operate welder 'round the clock.

is New Arc Welding ok tells you how you can 'T MORE out of our arc welders —

performance in man-hours machine hours is of prime ortance today. Have your brush up on latest techques and procedures in weld- to get greater efficiency with effort. "Practical Arc Weld- ing" shows you HOW.

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Hobart "Simplified" ARC WELDERS

HOBART BROS. CO., Box TB-102 TROY, O.

☐ Send information on "Speed Feature" Welders

☐ Send _____ copies "Practical Arc Welding"

☐ Check Enclosed ☐ C. O. D.

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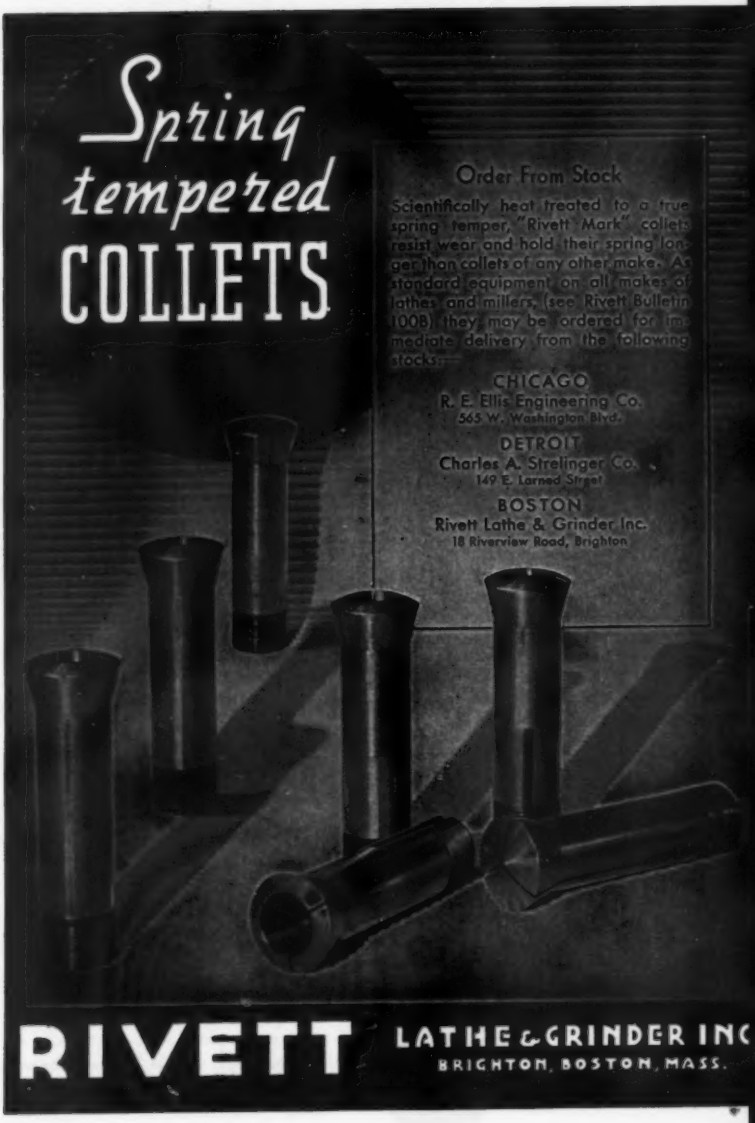
ADDRESS _____

CITY _____ STATE _____

"of the World's Largest Builders of Arc Welding Equipment"


Spring tempered
COLLETS
Order From Stock
Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 1008), they may be ordered for immediate delivery from the following stocks:
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HARDINGE PRECISION LATHES

- Extreme Accuracy
- High Spindle Speeds
- Ease of Operation

RDINGE Precision Lathes combine these three important uisites for production:

eme *Accuracy* for the close tolerances demanded by to-'s rigid manufacturing standards.

h *Spindle Speeds* mean greater production and a better sh.

e *of Operation* enables relatively unskilled operators to duce parts to the necessary close limits without expensive ing.

mance has established leadership for HARDINGE™

SPECIFICATIONS: 1" collet capacity, 6" step chuck capacity, 5" jaw chuck capacity, 9" swing, 36" bed, lever speed control with spindle brake, 8 speeds forward and 8 speeds reverse from 230 to 3900 R.P.M.

HARDINGE

HARDINGE BROTHERS INC., ELMIRA, N.Y., U.S.A.

ARMSTRONG

This war is being won with High Speed Steel in Armstrong Tool Holders

Victory begins in the tool rooms and machine shops, for striking power first takes form in jigs, fixtures and dies . . . in more and more machine tools, each operating continuously at the highest possible speeds and feeds.

Since the capacity of any machine tool is limited to the efficiency and capacity of its cutting point, we can afford, today, only the strongest and most efficient cutting tools with the finest cutting edge. This means, for all general lathes, planers, slotters and shapers, and for many screw machine and turret lathes, the correct ARMSTRONG TOOL HOLDER with a cutter bit of high speed steel.

With high speed steel so essential to top efficiency, so widely needed and with our national supply so difficult to maintain, to waste high speed steel in forged tools is to delay victory because the same high speed steel consumed in one forged tool would supply high speed steel cutters for 10 ARMSTRONG TOOL HOLDERS—would go 10 times as far, would do 10 operations instead of one, would machine 10 times as many dies or jigs. Use ARMSTRONG TOOL HOLDERS wherever possible to "Save: All Forging, 70% Grinding and 90% High Speed Steel." This war is being won right now in jigs and fixtures—with High Speed Steel in the ARMSTRONG TOOL HOLDERS used in over 98% of the machine shops and tool rooms.

Armstrong Bros. Tool Co.
"The Tool Holder People"
308 N. Francisco Ave.
Chicago, U. S. A.
Eastern
Warehouse and Sales
199 Lafayette St., New York

Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

35,000 This Issue *Volume 38, No. 10*

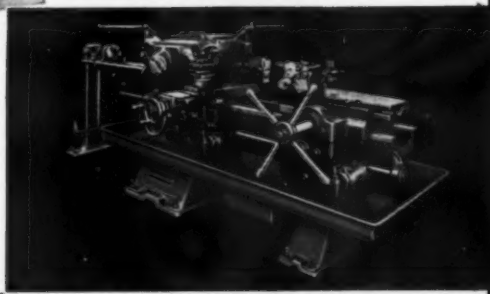
OCTOBER 1942

Acceptance under the Act of June 5, 1934, authorized February 12, 1941

Phone: HARrison 6040 Cable Address: HITCHPUB

YOU WOULDN'T TRADE THIS

LIKE many an early leader in the machine tool field, David H. Hilliard received his training in the Vermont shop, of which Jones & Lamson Machine Company is a direct successor. When war broke out in 1861, Hilliard worked night and day to complete a wagon load of heavy telescopic rifles. These he drove to Concord and presented to the Governor of New Hampshire to arm a picked company of Sharpshooters.



No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.

OR A WAGON LOAD OF RIFLES

861 a wagonload of rifles was a major bution to national defense. In 1942 it help some, but it wouldn't help enough. on the vast scale in which the fate of orld is being weighed today, one of the eat contributions to the survival of free- s an intangible contribution, and it comes the same original sources as Hilliard's load of small arms.

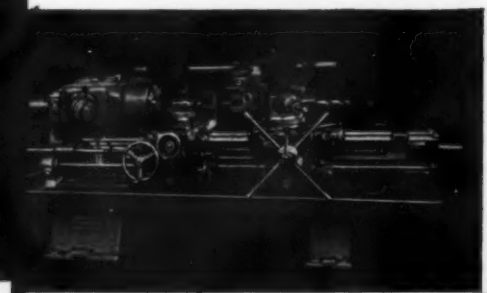
is contribution consists of the skill, ex- ce and adaptability of a machine tool eering and precision manufacturing orga- on whose continuous development began Hilliard's predecessors over a century ago. ued in turn by men like Hubbard, Kendall, Robbins, Lawrence, Howe and Hart- ness, this unbroken progress makes Jones & Lamson machine tool technique available to you in its present high speed, modern form.

With Jones & Lamson equipment you can speed war time production now, and with it later you will be in position to earn a living profit in the hard years ahead.

That's why it pays to put production problems up to Jones & Lamson engineers. That's why it is so advantageous to be Jones & Lamson equipped. Illustrated catalogs of this equipment are available, and inquiries from large plants or small receive careful study here.

ONES & LAMSON

ACHINE COMPANY, Springfield, Vermont, U. S. A.



o. 7A Jones & Lamson Saddle Type Universal Turret Lathe with standard chucking equipment.

Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

PROFIT PRODUCING MACHINE TOOLS

E CUTTERS WILL REPAY MANY TIMES

Depending upon how they are handled and used, high speed steel milling cutters can be as durable as an all-day sucker in the hands of a ten-year-old boy, or as fleeting as an ice cream cone. Nevertheless, it's not necessary to nibble with standard milling cutters. They have the possibilities of producing at a rapid rate, taking a man-sized cut, and machining an unbelievable number of parts before wearing out. The booklet illustrated at the left tells you how to develop and take advantage of these possibilities.

A thorough understanding of cutters constitutes an important step in production. For one thing, it reduces the number of times cutters must be changed on long jobs, creating an opportunity to use the production possibilities of bed-type millers, like the CINCINNATI No. 2-24 illustrated below. Feed gears on these machines may be changed without the use of a wrench; arbor supports may be removed with the brace in place; table has dog controlled automatic cycles, with 125" per minute power rapid traverse. Complete data and specifications may be found in the illustrated literature mentioned below.

CINCINNATI

Right: CINCINNATI No. 2-24 Plain Automatic Milling Machine; catalog M-965 . . . CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine; catalog M-909.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

Quick Changes on Van Norman

RAM-TYPE MILLING MACHINES

When the operator has completed a horizontal cut on a Van Norman Ram-Type Miller, and wishes to proceed to an angular or vertical cut . . . *he does not need to touch the set-up on the table.* All he has to do is unclamp the swiveling cutterhead, swing it to the required position, reclamp . . . *and start the next cut.* Only a matter of moments, compared with the time needed to reset the work. And one of the greatest sources of errors is completely avoided. This exceptional ease and convenience of operation provide gains in time, accuracy and output. So today, throughout America's war industries, Van Norman Ram-Type Millers are delivering the goods in great plenty . . . and in plenty of time.

VAN NORMAN
Machine Tool Company
SPRINGFIELD, MASSACHUSETTS

In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record

Which Costs Less?

THIS is the place to find out!

EXPERIENCED tool buyers know that it is false economy to buy cutting tools strictly on a price basis. Tool for tool, you get more production and lower *actual* cost with TECO than with lower-priced tools . . . through higher-speed operation, dependable uniformity and longer tool life.

Tool cost is a small part of operating expense. Original cost at a few cents more, resulting in dollars gained in extra production, proves the economy and value of TECO use.

Put TECO Carbide Tools to the test. Let your own production records furnish your proof. Grades and styles for practically every machining need. Tell us your requirements.

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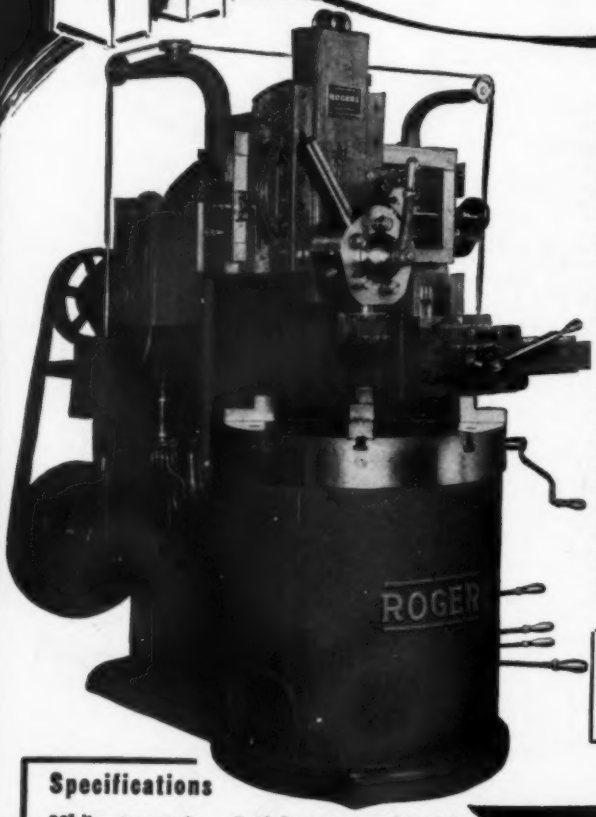
TECO Pioneers in Tungsten Carbides for over a Quarter Century **CARBIDE TOOLS**

ROGERS "Perfect 36"

VERTICAL TURRET MILLS

practical features HAVE STEPPED UP MY PRODUCTION!



One of the many rea
Rogers "perfect 36's"
crease war production i
specially designed **Sw**
Side Head. This new Ro
development permits a
ting at any angle each sid
vertical up to 35 degre
provide simplified tool set
for irregular shaped pie

Another feature is the b
in, graduated dial which
time in making set-ups
original and second runs

And still another featu
the level, horizontal c
that makes it easier
quicker to slide the work
exact position for bo
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No lifting or balancing
locking up work! Be su
call on Rogers today a
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Level" with 36" diam
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"Perfect 36."

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Knowing How Since 18

Specifications

36" diameter capacity . . . 5-sided main turret and 4-sided side turret . . . rapid traverse on main head . . . box type main and side rail, with saddle, swivel and tool stake . . . 6⅜" diameter spindle with 175 sq. in. V-shaped bearing 14⅞" in diameter . . . foot operated controls . . . standard and high speed models.

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MACHINE WORKS
FACTORY: ALFRED, N. Y.
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Jarvis POWER TOOLS

READY FOR ACTION

Jarvis Power Tools as used in the manufacture of engines, propellers, planes, ship and instruments have done their part.

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

An Operating Advantage On EVERY War Job that:

- *Reduces worker fatigue*
- *Cuts tooling time*
- *Increases safety*
- *Steps-up production*
- *Permits a more efficient motor winding to dissipate operating heat*

3 H.P. GEARED HEAD

MALL Flexible Shaft Grinders are available for VICTORY PRODUCTION from ½ H.P. to 3 H.P., with caster base or overhead trolley mountings for maximum portability in direct-drive or geared-head models. Constant working speeds range from 3450 to 4500 r.p.m., on 60 cycles.

Each unit has a constant speed, heavy duty full ball-bearing, dust and vaporproof or ventilated type motor that delivers 100% additional H.P. on a momentary overload.

★★ Quickly interchangeable tools for Grinding, Disc, Cone and Drum Sanding, Wire Brushing, Polishing and Drilling make these machines easy to keep busy.

Write, wire or phone for full details.

MALL TOOL COMPANY

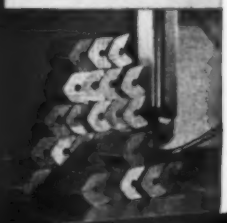
7742 South Chicago Ave., Chicago, Ill.

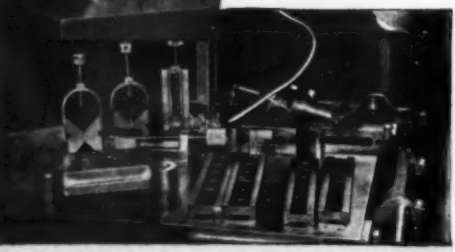
WHY WAIT WEEKS FOR TOOLS or PARTS?

★ *Make them the Same Day on a*

DoAll

Thirty-two Stitching Dies 1¾" thick cut from oil hardening tool steel in 23½ hours on the DoAll.

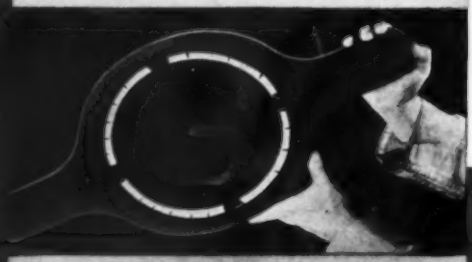




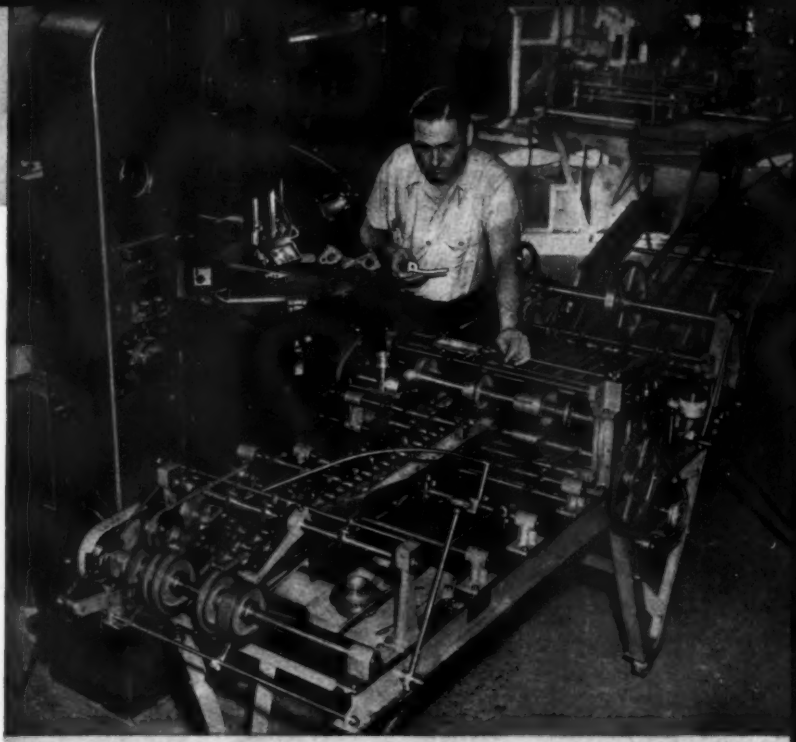
All external and internal shape cutting in making these special parts and molds was done on the DoAll.

● In addition to doing a fine job in regular production work, the DoAll is the 100% patriot today to which you can turn in emergencies.

Don't tie up vital machines for weeks waiting for replacement parts from the factory. Make them on the DoAll—the fastest precision method for external and internal cutting without waste, of all kinds of metals, alloys, plastics, wood, etc. Finished jobs are ready for use—further machining is not necessary.



A large airplane plant makes these Propeller Wrenches on the DoAll.



25 different parts of this Automatic Paper File Folding Machine are now made on the DoAll—and without blueprints.

ne DoAll also makes special tools and
des, following a hairline layout in the least
possible time. Short runs of metal products
an be handled on the DoAll, relieving
heavier, higher-priced machine tools for
her work. Sheet metal or alloy can be
acked and 20 to 80 parts cut out at one
me.

ASK FOR DEMONSTRATION

A factory-trained man will call with a DoAll and show you its production versatility, economy and time-saving features.

READ THIS BOOK—Send for a copy of "DoAll on Production", a picture story of this little giant of industry.

CONTINENTAL MACHINES, Inc.

00 S. WASHINGTON AVE., MINNEAPOLIS, MINN

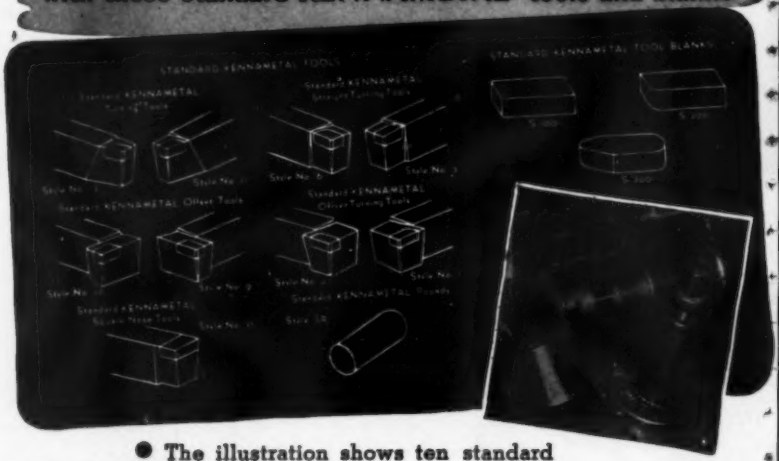
Associated with the DoAll Company, DesPlaines, Ill.
Manufacturers of Band Saws and Band Files for DoAll Contour Machines

THE EXACT SIZE FOR YOUR JOB

9 *out of* 10 *steel-cutting jobs*

CAN BE HANDLED QUICKLY and CHEAPLY

with these standard KENNAMETAL* tools and blanks



● The illustration shows ten standard styles of KENNAMETAL tools. They will be found suitable for the majority of turning, boring, and facing operations on steels hardened up to 550 Brinell. Save time by using these standard tools, or by ordering KENNAMETAL blanks and brazing your own tools.

All KENNAMETAL tools are more ecomical and more efficient than ordinary ones. Their great hardness, wear resistance and crater-resistance makes them outlast other tools, and do more work in any given time.

Get the facts about KENNAMETAL! Write for a copy of the Vest Pocket Manual containing full details.

Visit The Kennametal Booth C-110 At The National Metal Congress

* INVENTED AND MANUFACTURED IN U. S. A.

McKENNA METALS Co

135 LLOYD AVENUE, LATROBE, PENNA.

KENNAMETAL THE All American CARBIDE

Integral Drive

RECISION BENCH LATHE

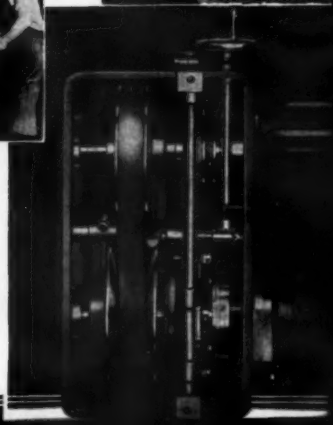
·new stream-liner incorporating
l the old Stark accuracy and stamina

HE first tool of its class with built-in Motor and speed changing mechanism (patented). Marvelously compact: nothing under the bench; no special h or cabinet needed; even bolting down cessary:

ly moving control lever to right engages clutch, vertical position releases; moving e left instantly brakes the moving spindle.

dard (tool room) Model has time-tried bis taper spindle bearings 156 to 2200 n.—the best for sustained accuracy.

Speed (manufacturing) Model fitted best precision pre-loaded anti-friction ings, 260 to 3500 r.p.m.



have 40 inch bed, 9 inch swing, 20 inches between centers; r ¾ or 1 inch collet capacity. Take regular STARK Attachts collets and chucks.

Stark (patented) built-in drive, integral with the Lathe itself, ays a ½ h.p. geared ball-bearing motor drive through a disc h and through V belts to the headstock, giving any split speed e turn of the small hand wheel in front of operator.

Write for full information

TARK TOOL COMPANY
WALTHAM, MASS., U. S. A.
ESTABLISHED 1862

GINATORS OF THE AMERICAN BENCH LATHE

LYON *Hydraulic* MATERIAL HANDLING EQUIPMENT

Built to Fit Your Special Needs

- Hydraulic lift trucks
- Hydraulic pallet trucks
- Hydraulic elevating tables
- Hydraulic die-handling trucks
- Hydraulic sheet-handling trucks
- Hydraulic stacking, tiering, and hoisting equipment
- Utility trucks and skid platforms
- Special purpose production machines, hydraulic-powered
- Aircraft servicing and production equipment

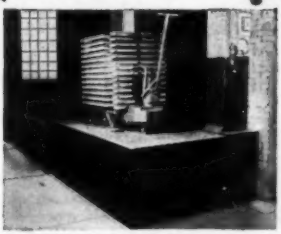
Numerous designs Available in all These Units:

Special Adaptations, to Order:

Double - Faced Pallet Type Lift Truck

Telescopic Type Hydraulic Elevating Table

Portable Hydraulic Elevating Table



Hydraulic Elevating Platform — eliminates dangerous ramps.

Toggle Lever Type Hydraulic Sheet Handling Truck

"LYON-Raymond hydraulic material handling equipment fills a vital and vital need in every production and maintenance program. Moves materials from freight car to stock room; from conveyors or other trucks to the actual operating of the machine. It lifts dies and heavy parts from press or workbench, depositing them safely on table or floor. It positions heavy units in assembly; levels stacks of sheets for efficient feeding. It does countless other special jobs.

• • •

ASK FOR LITERATURE

Special bulletins are available outlining various uses of LYON-Raymond equipment in heavy industry, in processing plants, in aviation. Tell us your problems and we will send literature that applies.

No matter what your handling problem . . . if it involves any of the operations in the list below . . . let LYON-Raymond's engineers help you find a solution. They have proved to scores of the largest companies in America that hydraulic operation is the fastest, easiest, safest and most reliable handling method.

CARRYING	REVOLVING
DUMPING	SPOTTING
ELEVATING	STACKING
FEEDING	STORING
HOISTING	TIERING
LEVELING	TILTING
LIFTING	TRANSPORTING
LOADING	UNLOADING
LOWERING	UPENDING

25-ton Hydraulic Press—a built-to-order machine.

Hydraulic Die Handling Truck (with die separator and winch)

Standard Model Hydraulic Lift Truck

LYON-*Raymond* Corporation

Formerly Lyon Iron Works — Established 1840

181 Madison Street — Greene, N. Y.

Material Handling Equipment Helps Solve the War Labor Problem

Industry Has Turned to SUNNEN PRECISION HONING

For Speed—Accuracy—and Super-Smooth Finish

★ Close tolerances — super-smooth finish for perfect functioning of parts, while important to other industries, are *vital* throughout the field of aviation.

That's why hundreds of leading producers of war equipment, munitions, the manufacturers of aviation instruments and controls, have adopted Sunnen Precision Honing for sizing and finishing internal cylindrical surfaces from .185" to 2.400"—quickly, accurately, and at a lower cost.

Does Not Require Skilled Labor

Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice!

This practical, inexpensive, economical machine can be set up and work located in one minute. Size adjustment can be made while machine is in motion with work on mandrel. When expensive reamers or broaches get a little undersize, many manufacturers remove the last thousandth or so with the Sunnen Precision Hone. Relieves big internal grinders for other jobs.

Corrects errors of out-of-roundness or taper caused by previous operations. Maintains alignment. Facilitates duplication of sizes.

In plant after plant, the Sunnen Precision Hone is showing production increases of 100% to 500% with corresponding savings in costs. For faster, lower-cost honing of small diameters, put Sunnen equipment to work in your plant.

Write for FREE BULLETIN

—giving complete information. Or if you prefer, a Sales Engineer will call and demonstrate this equipment in your plant on your job.

SUNNEN PRODUCTS CO. • 7935 Manchester Ave., St. Louis, Mo.

Canadian Factory: Chatham, Ont.

SUNNEN

Typical Examples

As you can readily appreciate, we cannot publish detailed information on Sunnen "success stories." However, here are a few general examples of the type of aviation parts being handled on the Sunnen Precision Hone.

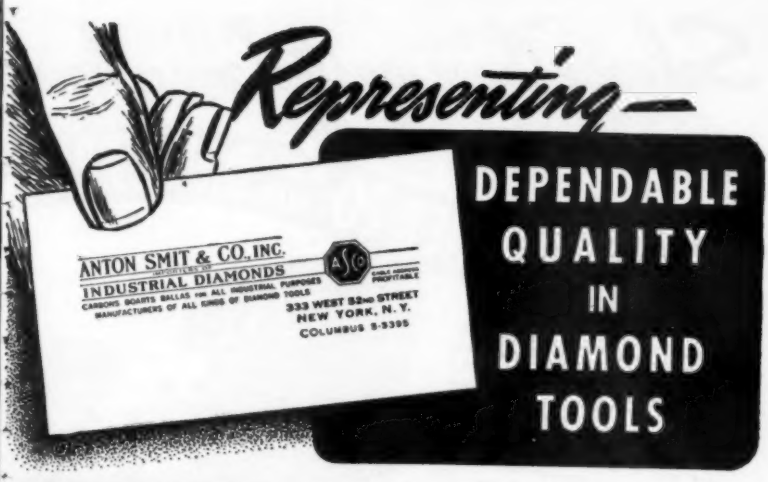
Aluminum Aircraft Link "produces high finish without bell-mouthing."

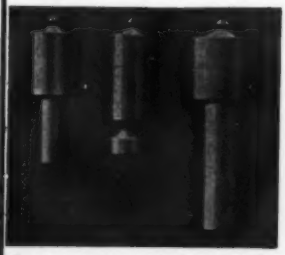
Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.

Saved time in producing a smooth, accurate finish on this bronze remote control valve body.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Hardened Steel Ring Gauge—finished to an accuracy of .000025" for roundness and straightness.





Landis, Norton, Cincinnati Nibs

Shaped Tools ● Ascopoint Dressers Valve Refacers ● Impregnated Dressers ● Diamond Pencils ● Phonopoints Glaziers' Tools ● Tungsten Diamond Wheels ● Wire Dies ● Saw Blades Core Bits ● Diamond Powder.

As every diamond buyer knows, there are many types, sizes and grades of diamonds, differing vastly in cutting ability and value. Therefore it requires skilled diamond experts to properly classify, cut and set these diamonds to suit the needs of various industrial operations.

Each representative of Anton Smit & Co., Inc., is fully qualified to study your needs and recommend the diamond or diamond tool most efficiently adapted to your requirements. His guidance is far more valuable to you than "savings" offered by unknown vendors selling "bargain" diamonds. An ASCO Diamond Tool pays for itself in a very short time.

Anton Smit & Co., Inc., brings you the established reputation of over 30 years' specialization in industrial diamonds and diamond tools.

WRITE FOR DETAILED LITERATURE.

ASCO

DIAMOND TOOLS

ANTON SMIT & CO., INC.

Leonard I. A. Smit, *Managing Director*

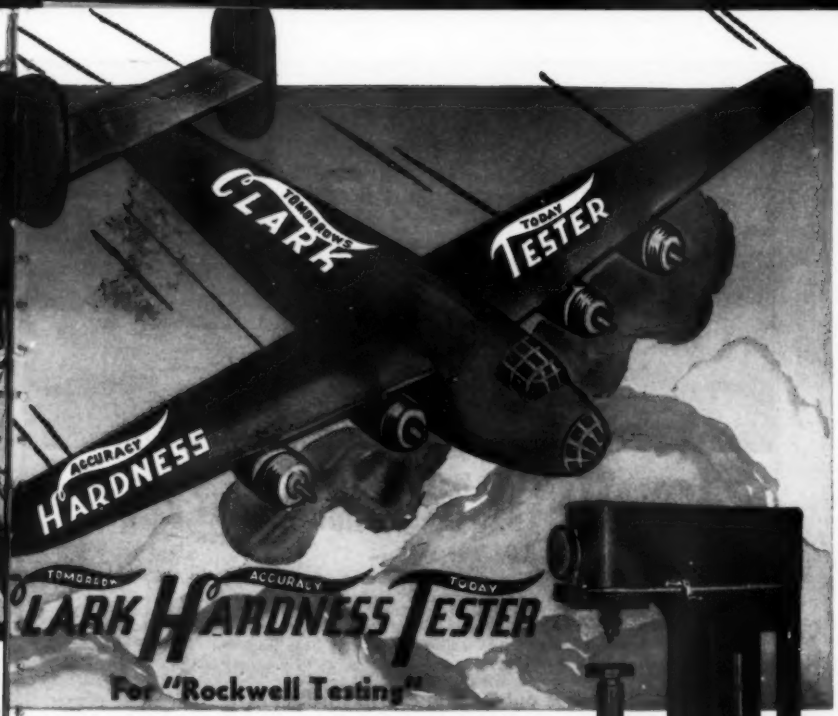
333 WEST 52nd STREET NEW YORK, N. Y.

Detroit: ANTON SMIT INDUSTRIAL DIAMOND CO., Inc. 5100 Lyndon Ave.

CANADA

Windsor, Ont.: ANTON SMIT DIAMOND TOOLS, Ltd., 1323 Tecumseh Rd., E.

Toronto Sales Office: 100 Adelaide St., West



A precision built instrument for testing the hardness of hardened and soft steel, non-ferrous metals and metal alloys, by penetration; calibrated on the major load of 150 Kg. which consists of three calibrated weights (60 Kg, 40 Kg, and 50 Kg) and on the minor load of 10 Kg, thus being able to make either direct or conversion hardness readings.

INCLUDED WITH EACH INSTRUMENT:

Diamond Penetrator	Checking Anvil
1/16" Ball Penetrator	3½" Anvil
1/8" Ball Penetrator	"V" Anvil
Metal Dust Cover	Adjustable Steady Rest

Leather Cover for Instrument
Telescoping Cover for Elevating Screw
Oil Reservoir for Elevating Screw

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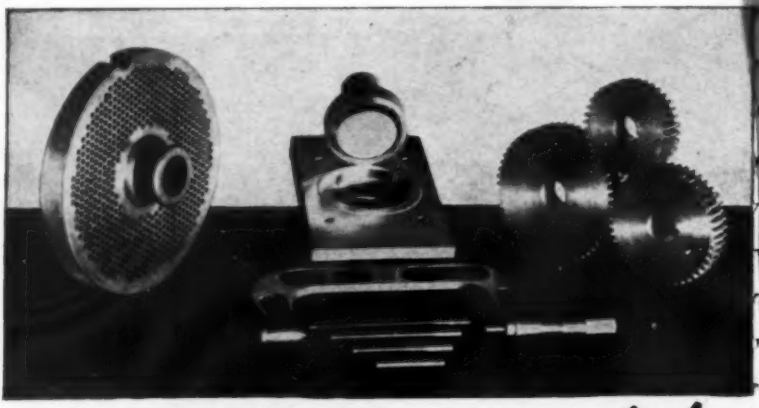

WHY TRUFORM IS IMPORTANT *today*

Truform Non-Shrinkable Die Steel, for use in applications where extreme accuracy is essential, has the ability to retain its shape, which eliminates expensive replacement of dies and tools ruined by distortion during heat treatment. It can be used to advantage by both inexperienced men as well as by veterans of the industry.

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Write for a copy of our new booklet listing applications and working data. Use of Truform results in longer die life and minimum press shut-down time; both factors being essential to production speed-up and war-time conservation of steel and machines and man hours.

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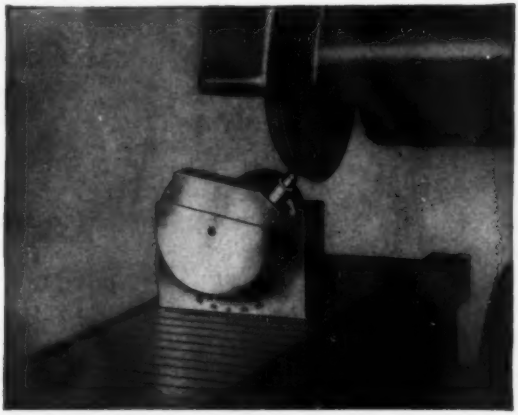
CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

Welch

QUICK ANGLE DRESSER



As suggested by its name, the Welch Quick Angle Dresser can be set quickly for dressing the grinding wheel to any desired angle. It is small, compact, durable; simple in design and construction. All surfaces are hardened and ground. Furnished in plain or Vernier type. Plain dresser graduated in degrees . . . Vernier reads in degrees and minutes. The Vernier being an integral part of the base block eliminates any possibility of error. 10 DAYS FREE TRIAL IF DESIRED.

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One Diamond is Furnished with Each Dresser

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TO WIN THIS WAR, more and more billions are needed and needed fast—AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!

This means a *minimum* of 10 percent of the gross pay roll invested in War Bonds in every plant, office, firm, and factory in the land.

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Write for Catalog of "UNBRAKO" Screw Products—now.

Knurling of Socket Screws originated with "UNBRAKO" yeas ago.

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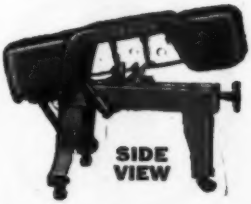

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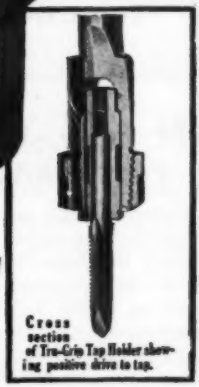
Here's How to Get More Efficient Tapping at Lower Cost

The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel," or pressure on the clutch, required to drive them thus avoiding needless tap breakage. With this sensitive Procunier smooth-operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to the tap loading.



Cross section of Tru-Grip Tap Holder showing positive drive to tap.

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Standard Procunier Tapping Heads can be equipped for external threading. Produce accurate work and increase output.

SEND FOR BULLETIN giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder—and also the full line of Procunier Universal Tapping Machines, hand or foot operated.

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THIS TOO, IS A BATTLE FLAG....A CITATION TO 600 WORKERS FOR HELPING INDUSTRY TO

"Make the most of what you have"

BECAUSE it is an example of what can be done with what you have—of making the most out of *all available production facilities*—the Army-Navy Production Award to the 600 employees of the Simmons Machine Tool Corporation, "for high achievement in the production of war equipment," can be an inspiration to everyone on the industrial and home fronts.

Simmons did not wait for new equipment before getting squarely behind the Defense Program, Lend-Lease and America's own War Effort. Its employees never worried about the age of a machine tool or whether a textbook editor would consider it "obsolete."

With machine tools ninety-nine per cent of which had been in use for ten years or more, they have been helping to supply the American Arsenal by rebuilding all types of metal-working equipment and building new lathes, boring mills and planers.

This recognition of their efforts in the award of the Battle Flag of Production is an incentive to all Simmons employees and a challenge to continue to "Keep 'Em Running!"

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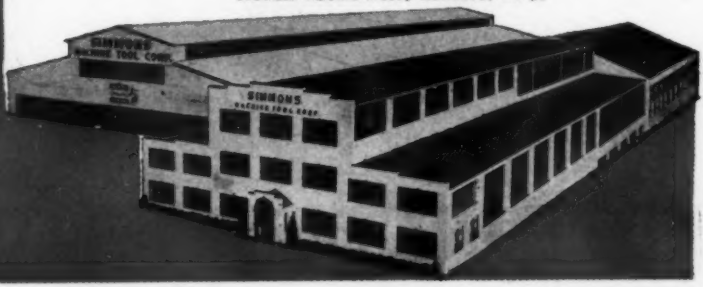

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UNIVERSAL CUTTER AND TOOL GRINDER

The Grand Rapids No. 1½ Universal Grinder has been designed and built to meet the demand for a high grade machine of medium capacity selling at a moderate price. This machine can be operated from the front or rear. Transverse, vertical and longitudinal movement can be made from either position.

Both vertical and cross movements are provided by means of an "Acme" thread in a bronze nut of liberal size. Both are fitted with graduated dials reading in thousandths of an inch. Sturdy, rigid of design it insures a freedom from vibration and guarantees the ability to produce accurately ground tools.

A powerful 1 H. P. motor built into the base provides spindle speeds up to 3450 R. P. M. Universal type head stock with swivel base graduated in degrees so that an angular setting can be arranged.

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BE *Wise* WHEN YOU MOTORIZE

● Get all the benefits that a correctly engineered job can bring you—*maximum* output, not just more output; and the *simplest* installation, not just an easy one.

Every Berkeley Drive is individually engineered to meet the precise requirements of the machine tool for which it is made. For that reason it permits the higher speeds and heavier cuts demanded today.

Compare the Berkeley for strength, simplicity, easy control, power saving, higher operator efficiency and all 'round trouble-proofness. Then your own sense of sound engineering will make the Berkeley Drive a natural preference. Write or wire for the production facts—they're mighty convincing!

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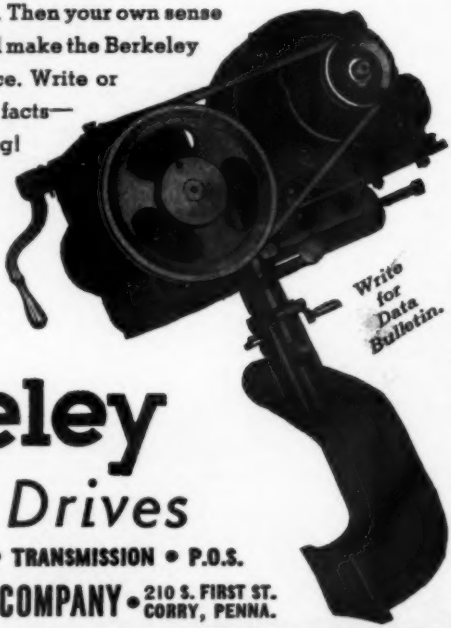
Lathes—Shapers—Planers—Milling Machines—Punch or Drill Presses—Grinders of All Types—Any Machine Tool



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Power Drives

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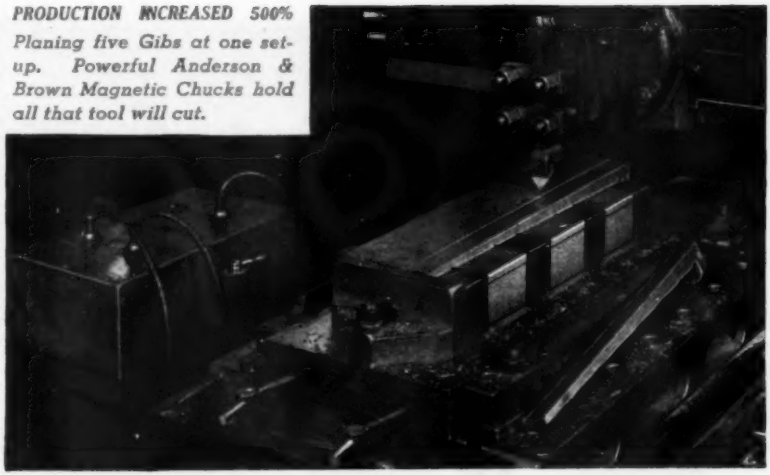
BERKELEY EQUIPMENT COMPANY • 210 S. FIRST ST. CORRY, PENNA.

THE DRIVE FOR *Greater* PRODUCTION

PRODUCTION INCREASED 500%

Planing five Gibs at one set-up. Powerful Anderson & Brown Magnetic Chucks hold all that tool will cut.



NOW— Super-Power Magnetic Chucks for Your Shapers and Planers!

Intense Holding Power and Flexibility of Anderson & Brown Magnetic Chucks Cut Your Production Costs

● The photo shows only one of the many time-saving applications of this remarkable new-type chuck. Utilizing the principle of "Magnetic Body Flo," this method of holding work goes far beyond the limitations of conventional magnetic chucks, providing *power* and *adaptability* not heretofore possible.

On all types of surface grinders, as well as planers and shapers . . . in the tool room and on the production line . . . hundreds of shops are now enjoying the amazing advantages of ANDERSON & BROWN Magnetic Chucks.

ILLUSTRATED CIRCULAR—FREE

Learn more about how this magnetic chuck can save you time and money! Write for your copy of "Magnetic Chucking Revolutionized".

ELIMINATES COSTLY FIXTURES

The above jigs and several operations were eliminated from the job illustrated at top of page. Why not save the cost of fixtures and speed up *your* production with ANDERSON & BROWN Magnetic Chucks?

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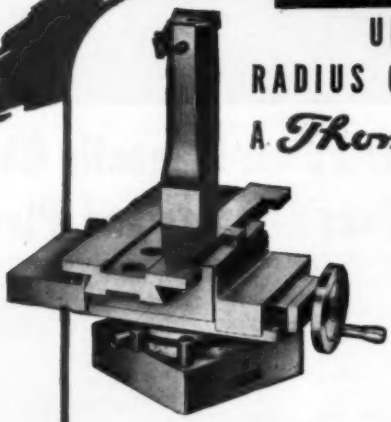
A
FLEXIBLE NEW TOOL
TO SPEED

Vital

PRODUCTION
UNIVERSAL
RADIUS GRINDING DRESSE
A *Thompson* PRODUC



This Dresser will dress a radius on wheel either concave or convex from thousandths to 4 inches and do san accurately and efficiently.

The Dresser is set by gauge bloc eliminating any guess work.

It will also dress any angles require on a wheel.

Also can be set for a radius and ang without changing the set up.

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Spring TOOL HOLDERS

CUTTING-OFF

Spring feature makes possible faster feed with a heavier cut. Cutters outlast 3 to 4 used in a solid holder. One grind only sharpens cutter.

THREADING

Threads close to shoulder. Produces smooth, accurate threads. No fitting to gauge when grinding. No adjustment in tool post after grinding.

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Assures faster, smoother machining, free from cutter marks. Ratchet design prevents cutter from turning under heavy feeds. Key in bottom of holder prevents side sway.

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NO DAMAGED WORK
NO BREAKING OF CUTTERS

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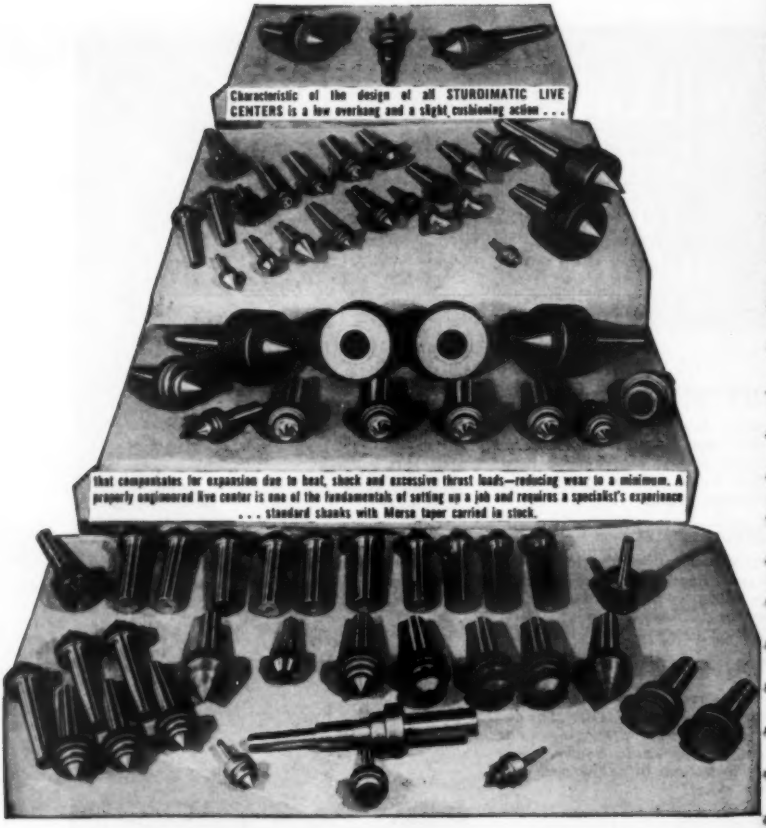

Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

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For 24-hour War Production, OTC Heavy Duty WRENCHES and PULLERS are making machinery maintenance easier, quicker and safer in many factories. They avoid needless damage to precious parts, reduce injury hazards, cut down repair-time delays.

Also in the Navy, Merchant Marine, Ship Yards, Power Plants, Mines, Mills and Railroad Shops, OTC GIANT WRENCHES and other tools are helping to solve operation - maintenance problems. *Write*

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Headstock moved back and at angle position for grinding tapered hole.

Looking down on top of machine from grinding spindle end.

Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6" . . . grinds holes ¼" to 18" in diameter . . . holes up to 9" deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

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For War production, America's metal-working plants require thoroughly reliable tool and work holding equipment. The choice invariably is for a Jacobs Chuck, as typically illustrated by this drilling job on a jig for a Douglas aircraft nacelle assembly.

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IT HOLDS!

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JACOBS CHUCKS

The National Standard for Victory!

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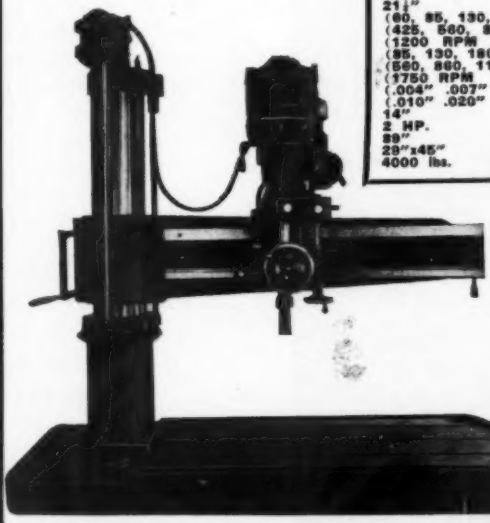
RADIAL DRILLS

USED THE WORLD OVER

SPECIFICATIONS:

	9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
Drills to the center of circle on base or table	73½"	98"	120"
Length of arm	3'	4'	5'
Greatest distance from spindle to base	43½"	48"	48"
Minimum distance from spindle to base	9½"	15"	17"
Minimum distance from spindle to column	10½"	10"	10"
Traverse of spindle	9½"	9½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	38½"	48½"
Traverse of arm on column	21½"	24"	22"
Spindle speeds with 1200 RPM motor	(60, 85, 130, 180, (425, 560, 860, (1200 RPM		on all models
Spindle speeds with 1800 RPM motor	(85, 130, 180, 274, (560, 860, 1180, (1750 RPM		on all models
Feeds per revolution of spindle	(.004" .007" (.010" .020"		on all models
Bearing of arm on column	14"	16"	18"
Size of main driving motor	2 HP.	2 HP.	2 HP.
Height of drill column over gears	89"	98"	98"
Working Surface of Base	29"x45"	36"x60"	36"x88"
Net weight	4000 lbs.	6200 lbs.	7000 lbs.



Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

Early delivery possible.

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National Acme CENTRIFUGE SAVINGS

FIT INTO YOUR WAR PRODUCTION PICTURE, TOO!

Centrifuge savings are applied to small shops like this and to hundreds of machines of all kinds employing thousands of gallons of coolants.

nes take their worst beating when allowed to run with ts and lubricants containing accumulated grit and other nination. Merely separating chips and returning the cool- us make-up is both unsafe and costly.

cation with a National Acme precision built centrifuge es all the finely divided gritty materials, and tangible s in any shop are these —

- **You grind and replace cutting tools less frequently.**
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- **You materially reduce both the quantities and costs of coolants and lubricants.**

entrifuge engineers will freely show you the application uited to your shop. *Complete Catalog, P-41.*

Destructive grit removed from coolant used one day.

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Use

and SAVE

WITH Martin Master Collets, the replacement of three small pads gives you the equivalent of a brand new collet. The steel required for these pads is only a fraction of that required for a complete collet . . . representing a definite saving in the vital alloy steels needed for collet manufacture.

Of equal importance is their time-saving feature. The interchangeable pads are removed from the end of the collet while the collet itself remains in operating position in the machine. A complete change of collet size can be made in from five to seven minutes . . . making possible a substantial increase in the number of hours of a machine's productive time.

The pads used in Martin Master Collets are integral parts of the locking wedges which fit tightly into the end of the collet. They will positively not become loose. When it is necessary to change the pads, a few turns of the wedge screws permit quick removal.

Under present conditions, the many advantages of these collets . . . particularly for machines with capacity of 1½" and over . . . should be given real consideration. Write for full details.

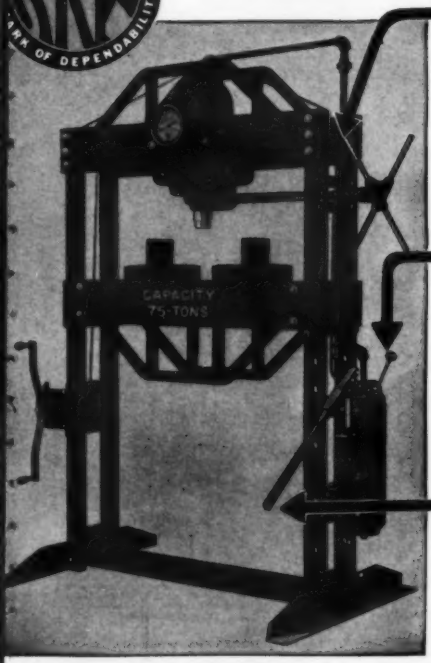
The MARTIN MASTER COLLET

MODERN COLLET and MACHINE CO.

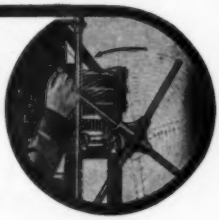
403 Salliotte Street - - - Ecorse, Michigan

Here's how SPEED is built into HYDRAULIC ARBOR PRESSES

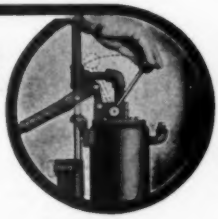
SINCE 1916 KRW ARM OF DEPENDABILITY



1 SPIN THE HANDWHEEL and the ram speeds to the work by fast mechanical action instead of slow, laborious hydraulic pumping.



2 FLIP THE BALL ARM to close the valve instead of slowly turning a handwheel type control.



3 START PUMPING and immediately get tons of pressure on the work because the hydraulic cylinder was automatically filled with oil during operation No. 1.

● The new KRW Presses are designed for SPEED...*speed* in bringing ram to the work...*speed* in developing hydraulic pressure...*speed* in raising ram to remove the work. The "capstan" type handwheel raises the ram with the same mechanical speed employed in lowering it.

A *Two Speed Pump,* controlled by a quick, half turn of a finger lever, enables operator to select the speed best suited to the job—the double plunger action is 2½ times faster than the single action. Write for bulletin describing 25, 50 and 75 ton presses—priced from $198.00*.

*Prices F. O. B. Arcade, N. Y. Slightly higher west of Rockies

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Please send Hydraulic Arbor Press Bulletin No. 27.

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By and large, subcontracting has rked out very well indeed, in the eedy production of war equipment— d in spreading the work among nts that might otherwise be idle. ncis A. Westbrook reviews briefly, he of the things that have been done this field in the story beginning on ge 71

ow smooth is smooth? Walter kelson of the General Engineering boratory, General Electric Co., tells w his Company has approached this blem, designating and illustrating shes thru the medium of actual ish specimens. See page 85

ome personnel problems are dis- ed in Edmund Mottershead's sec- d contribution to The Foremanship um. This series of articles is based actual cases presented to Mr. Mot- shead and the discussion may help ve similar problems encountered ewhere. See page 99

he War Production Metal Show to held in Cleveland's Public Audi- ium, Oct. 12-16 will provide an op- tunity for mass dissemination of in- mation and ideas. It should help e many perplexing production blems. A brief preview and list of ibitors is given in the section be- ning on page 127

iling Engineering Data so that it l be readily available when needed at's the subject of W. C. DeGraff's y. He describes in detail, the sys- n used by Warner & Swasey and es suggestions and ideas that may used by other Companies in the cle beginning on page 139

housands of women are contribut- materially to Britain's mounting r production. Increasing numbers of men are entering American war industries. Dr. J. H. Hazelhurst, Panel Consultant, War Production Board tells some of the things that must be considered in employing women. See page 155

Carbides Dies for Tube Drawing is by Earl Glen of Carboloy Co., Inc., Detroit. It describes the use of carbide dies and mandrels for increased production of tubing. See page 167

In his third contribution on the subject of modern milling practice, John E. Hyler discusses the advantages and uses of carbide tools, on page 177

The important subject of manpower for the fighting and production fronts is discussed by Major General Lewis B. Hershey, U.S.A., Director of Selective Service. The procedure for deferment applications is outlined. See page 199

With shortages looming on some important items, the subject of conservation deserves serious consideration. Ernest W. Fair gives some timely suggestions for preventing waste on page 205.

Results of a nationwide survey on the subject of using larger electrodes in arc welding show that this will be a decided help in speeding the war effort. A. F. Davis, Vice President, Lincoln Electric Co., Cleveland presents the facts on page 209

"Let's Talk Shop" presents a number of helpful suggestions in the section starting on page 213

"Tooling Up for Victory" presents the monthly parade of new production tools and equipment in the section starting on page 241

Plants for Subcontract work 339
Mechanics Through the Ages 380

HOW TO GET THE MOS
OUT OF YOUR LATHE

No. 2 *in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient production.*

Keep Them Well Oiled

For lack of oil the bearing was lost;
For lack of a bearing the tank was lost;
For lack of a tank the battle was lost;
All for the lack of a film of oil.

All bearings should be oiled at regular intervals

Paraphrasing the rhyme about the horseshoe nail, an army officer is said to have used this verse to emphasize the importance of lubrication.

The proper lubrication of lathes and other machine tools will help our war effort by preventing production interruptions, and saving critical materials and labor by reducing the demand for replacement bearings, parts, and machines.

South Bend Lathes, like other fine machine tools, have large oil reservoirs, felt wicks, and oil retainers to guard against lack of oil due to temporary neglect or oversight. But for best results the lathes should be oiled at regular intervals. Even a camel must have an occasional drink.

Make Oiling a Habit

All oil holes and oil cups should be filled at least once a day — oftener when top speeds and feeds are employed. Best practice is to fill each oil hole in a regular sequence so that oiling becomes a habit and no oil holes are overlooked. When the lathe is in service on two or more shif oiling the lathe should be the fi daily task of each operator.

Use Correct Grade of Oil

When the correct grade of oil used in a well designed bearing the is little or no metal-to-metal conta However, when the wrong grade oil is used, or if the oiling is neglect the oil film will break down and t bearing surface may be damaged, a short time.

Write for Bulletin No. H2

Bulletin No. H2 giving more co plete information on oiling the lat will be supplied on request. Oili charts for South Bend Lathes (ady serial number), and reprints of t and other advertisements in t series can also be supplied.

SOUTH BEND LATHE WORK

Dept. 193 **South Bend, Ind., U. S. A.** **Lathe Builders for 35 Ye**

As The Editor Sees It

FEW people have a better understanding of the prewar Jap mentality than former Ambassador Joseph C. Grew.

He has told us that they put great store in what they consider to be the white man's flabbiness. They look upon us as constitutional weaklings, demanding our daily comforts and luxuries—entirely unwilling to make the sacrifices demanded for victory in a war against a military machine which has prepared for many years and trained itself in Spartan simplicity. They are banking on our supposed lack of hardness and toughness demanded by total war.

Well, we do have a lot of soft, selfish, spineless creatures that obstruct and clutter up the war effort. But, thank Heaven, we also have plenty of real Americans.

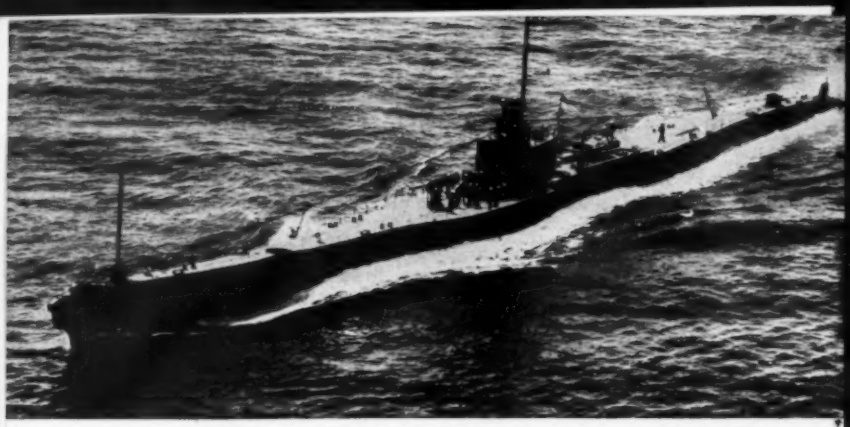
Wherever the Nips have met a fair sample of the caliber of our fighting men, they've had reason to think that maybe the sneak job at Pearl Harbor wasn't such a bright idea after all.

We've made a good start but it will take a lot more men, planes, ships, tanks, guns and determination to smash the land of the rising sun—and to help make a certain small-time paper hanger regret that he ever gave up that line.

It means continued hard work on the production lines. It means salvaging every available piece of scrap metal and getting it to the mills without delay. It means real conservation of our tires and precious rubber stocks. It means buying war savings bonds and stamps up to our individual limits. It means saving precious minutes on war production jobs so as to deliver **more . . . sooner.** It means being a good sport about rationing and other restrictions and regulations essential for victory.

In short, it means hardening and toughening ourselves and being real 100% Americans.

Wesley G. Paulson



Sub Propeller Shafts Needed Quickly!

Story of How Ryerson Ingenuity Saved Five Weeks

URGENTLY needed at a distant shipyard were fourteen forged submarine propeller shafts that must pass Navy specifications.

Forgings were specified, but none could be secured in time.

Quickly available in Ryerson stocks were cold rolled bars — the right size — but in five different analyses.

Navy Inspectors were skeptical. Could Ryerson heat-treat and assure uniform physicals—also furnish pull tests for each bar? Well, no; because the piece left after the bars were cut to the needed length, would be too short to make a standard 6" test sample. A delay of five weeks loomed ahead....

Then Ryerson metallurgists found a way: Inquiry revealed that the shafts were to be machined down at each end for a distance of 7". So, why not cut a piece from the side of each bar, *before machining*—enough for all tests yet leaving sufficient stock for machining to size? The idea worked perfectly.

The data charts always furnished with Ryerson Certified Steels provided the exact analysis of each bar and assured proper heat-treatment. A few minutes hacksaw work yielded the necessary test samples . . . and all fourteen bars passed the rigid

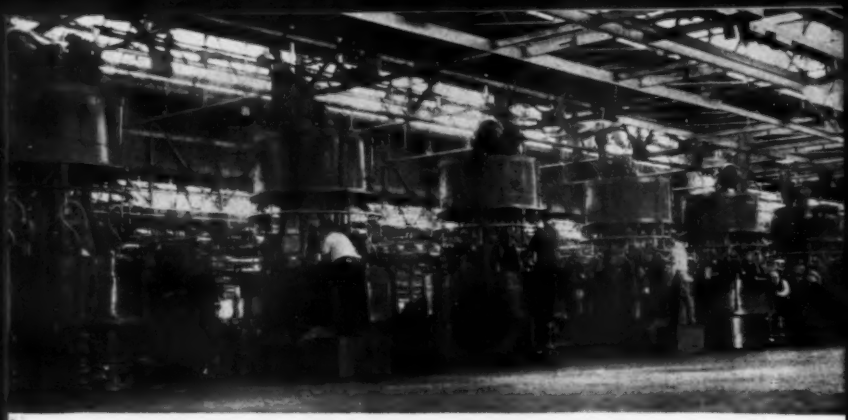
Cutting 6" test pieces from side of bar without affecting length.

Navy Inspection with flying color

Ryerson ingenuity has helped ma manufacturers in solving productio problems—has also cut ultimate d livery time from months to day Ryerson engineers and metallurgist backed by a century of service to th nation, are ready to work with you i accordance with WPB plan in makin the most of all available steel.

JOSEPH T. RYERSON & SON, INC., Chicago • M waukee • St. Louis • Cincinnati • Detroit • Buffa Cleveland • Boston • Philadelphia • Jersey C

RYERSON STEEL-SERVICE



What About Subcontracting?

By FRANCIS A. WESTBROOK, M. E.

FROM electric razors to spring-collets and machine gun parts; from boxcars to submarine and tank parts; from electric fans and motors to airplane turrets and control mechanisms—these are but a few of the switchovers, that have been taking place with mounting rapidity, as more and more of America's industrial plants have converted from pursuits of peace to finding their place in war-production. It is famed Yankee ingenuity gone militant, chief headache of the Axis partners. They know too well the might and power represented by American industrial output in the hands of brave soldiery—but they had counted on disunity and delays in getting the production machine rolling.

In factual reports by top-flight newspaper correspondents who toured 64 plants in 20 cities and 13 states, WPB's newly - released booklet, "Industry's War Production," gives interesting and dramatic take-offs on the functioning of American "know-how," adaptability and conversion for all-out victory. For those peacetime plants seeking ways and means of getting into the big fracas via subcontracting, the booklet holds much of value.

Not all plants have been able to convert, naturally. But there have been many thousands which have made important production switchovers, says the booklet. With some 100,000 parts needed for each Flying Fortress and a billion pieces for the 45,000 tanks to be made, for example, there has been plenty of opportunity for shops of practically all kinds, to play an important role in the vast war production program. This has been especially true in the case of metalworking organiza-

CARS TO PLANE ENGINES—Converted 100% to airplane engine production, this factory employs thousands of workers who are hitting their stride with the newly installed tools and machines. The workers are rough boring cylinder barrels of airplane engines before heat treatment in view at top of page. (OEM photo).

(Right) One of the many machining operations on a partially assembled carriage for a 37 mm anti-aircraft gun—in a Pennsylvania heavy industry plant converted entirely to war production.

(Below) Closeup of vertical turret lathe operations on an airplane engine crankcase. (OEM photos).

tions, tho by no means has it been confined to that field. Service shops of textile mills have made milling machines and gun parts. Some of the big tire companies have made gun mounts and so on.

When a former prominent maker of fine hosiery and lingerie can keep his wheels buzzing and help the war by making mosquito-netting for the armed forces, surely, as the Irishman said, there's some chance for you, and you, with plants, skills, experience and personnel for making what not.

How to go about it

The first step is to make a thoro analysis of your total facilities. List your plant equipment, personnel, the skills, functional and managerial, available, together with products you make regularly, or have made otherwise. These should include anything you have made along war production lines, either primarily or as a sub-supplier. With the survey well in order, take your engineer with you to the local WPB field office, Army District Procurement office or that of the Navy Bureau of Supplies. WPB Division of Information has released a booklet on this procedure. It would be well for

you to write it at local or Washington headquarters and get the book, using it as your guide. With your data well organized, you'll get every help and cooperation from these bodies toward enlisting your plant and facilities in the war effort, either as primary or subcontractor. WPB has established field offices in 13 regional areas, grouped about the U. S. Purpose of the offices, according to Donald Nelson, is to effect the closest and most efficient use of facilities within each area. Lists, for the purpose, are maintained, recording all the tools and facilities available in each area for war-production work. Establishments are urged to make known their subcontracting needs to their respective local WPB offices. This publication has helped bring many prime and subcontractors together. Send a list of your machine tools available to Subcontract Dept., Machine Tool Blue Book, 508 South Dearborn St., Chicago. No charge whatever is made for listing your plant facilities.

Aggressiveness helps

While WPB wants to give you every assistance, it doesn't mean that you need rest your case entirely in their laps. In this big emergency, cooperation is the watchword. Meaning that you needn't let yourself go rusty on aggressive sales effort. As witness the

(Above) Assembling elevating mechanism of a 37 mm anti-aircraft gun carriage in a converted Pennsylvania heavy industry plant.

(Left) This worker in a New England plant that normally produces electric dry shavers is now busy turning out spring collets for machine tools to be used in war production. The machine is a Norton Type C 6" semi-automatic cylindrical grinder with a 3" instead of the normal 1" vitrified aluminum oxide wheel. (OEM Photos).

Each mighty M-4 Tank receives a careful final check before it rolls off the assembly line of an Eastern plant. Official OWI photo by Rittase).

many instances where firms have landed important sub-contracts by the simple means of going after them. There's the story of the New York jeweler who specialized in platinum settings. Facing a shutdown and disemployment of 45 men, he considered going out of business. One of his employees, however, happened to mention the state of affairs to a sister, herself employed by a maker of surgical instruments. She talked to her boss about it, and soon her brother's boss got a contract order from her boss. Now the jeweler is making 9 separate medical items for Army-Navy. The only extra equipment he needed was a small lathe. When one operator called for a special small vise, it was procured from a dime store. Dozens of instances also are on record where some good, hard, sensible community-promotion and pooling of facilities turned the trick for towns which had thought themselves out of the picture, entirely.

He ran a lathe in '17 and now he's running one again for Uncle Sam—producing 37 mm gun parts in a former safe and lock factory. (OEM photo by Hollem).

Tide Turned

In the earlier days of subcontracting and conversion, when the plan was new and untried, without any definite setup anywhere to guide the way, there were stories of some tough going, to land war work. But the tide has turned. The hunters have become the hunted.

POP'S ON THE WAR-PATH AGAINST WAR-WORK WASTE

INDUSTRIAL man-hours were never more precious; high productive capacity never more urgent than right now. There is still too much waste of tool life through *improper use, improper care* and *improper selection.*

Files are especially exposed to these life-shortening abuses—particularly in new or partly trained hands. Shop managements can save filing time, improve efficiency, speed production, reduce rejects and material wastage, through education on the right *use* and *care* of files—and *The right file for the job.*

Nicholson and your mill-supply house can help you. Nicholson is an authoritative consultant to whom you can bring your filing problems freely.

FREE LITERATURE **on the fundamentals of filing.** ***FREE TECHNICAL BULLETINS*** **on special files for Stainless Steel, Aluminum, Brass, Plastics, Lead, Die and Foundry Castings, Die Making, Shear Tooth and Lathe filing. Name the ones you want.**

NICHOLSON FILE CO., Providence, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES

FOR EVERY PURPOSE

NICHOLSON U.S.A. MADE IN U. S. A.

One Chicago firm actively campaigned with ads in newspapers, seeking contacts with any firm—any size—within 300 miles, equipped with any automatic or hand screw machines, capable of producing small parts on war work subcontracts.

Maybe you've held off because your facilities and products are of such nature that they didn't seem to fit into the situation. If such is the case, don't let it deter you. Imperative necessities have brought about such strange combinations of different industries, that you can't know just where you can fit or will fit.

Conversion transformance

Conversion to war production left hundreds of smaller suppliers in unusual situations. Many of the more aggressive, long ago converted to some branch of war work. Thus, a bodybuilder is now making airplane tailparts. Presses, formerly used to knock out body parts, needed but an additional gear, fitting them to produce parts of lighter-gage metals. The firm's peace-time experience has been carried over to war production with modifications, resulting in doubling production capacity. Many shortcuts have been developed, such as welding instead of riveting. Only short training periods were needed to convert workers to the new setup.

A grinder in action on a 37 mm gun barrel in a converted Pennsylvania factory. (OEM photo by Hollem).

Arc welding is playing a vital role in our war effort and husky welding positioners like this facilitate the work. (Official OWI photo).

Size of firm is no barrier at all. A 2-man firm in Bay City, Mich., has just been awarded high honors for war production by WPB. It is turning out iron flanges for wooden pipes, made by another firm. Instances, like that of the firm with only 10 machines and a personnel list of 20 men, are by no means rare. The pooling plan makes possible the use of available equipment in an area . . . planers, boring mills, millers, grinders, lathes, etc., without need of new plant construction, retooling and layoffs. One of the biggest assets this plan presents is that work-


MAXIMILLER
A LEADER in the Industry
for More than 54 YEARS!
KEMPSMITH
KEMPSMITH MACHINE CO. • MILWAUKEE, WISCONSIN, U. S. A.
PRECISION BUILT MILLING MACHINES SINCE 1888

ers need not be removed from their homes, imposing no added housing problems.

The York Pool

Examples of subcontracting and conversion in achieving America's phenomenal war production can be multiplied infinitely. Among the standouts, however, exemplifying what can be done, given the will and determination to cooperate, is the accomplishment at York, Pa. Due to the aggressiveness of York Safe & Lock Co., the town can be said to be on 100% war-production basis. The firm, long a prominent producer of intricate locking mechanisms and safes, has made vault doors as heavy as 300 tons. In World War I, it had some experience making firing mechanisms for armaments. The town and environs possess, also, many metalworking shops, with employees accustomed to precision work.

This Norton cutter grinder formerly ground cams on shaver motor shafts. It is now grinding permanent magnet rotors. The metal is Alnico and the octagonal shape consists of surfaces which are arcs drawn from the center of the piece. (OEM photo by Hollem).

These heavy steel hulls and bogie-wheel assemblies in an Eastern plant give some idea of the massive construction of our new land battleships. (Official OWI photo by Rittase).

York Safe & Lock Co. made a list of all these plants and their adaptability to war work. It resulted in the firm's getting a huge war order. This it broke down into some 6000 parts. 45% of the work was farmed-out to nearby shops. Some new machinery was necessarily involved. But every existing machine in the area is utilized as far as practicable.

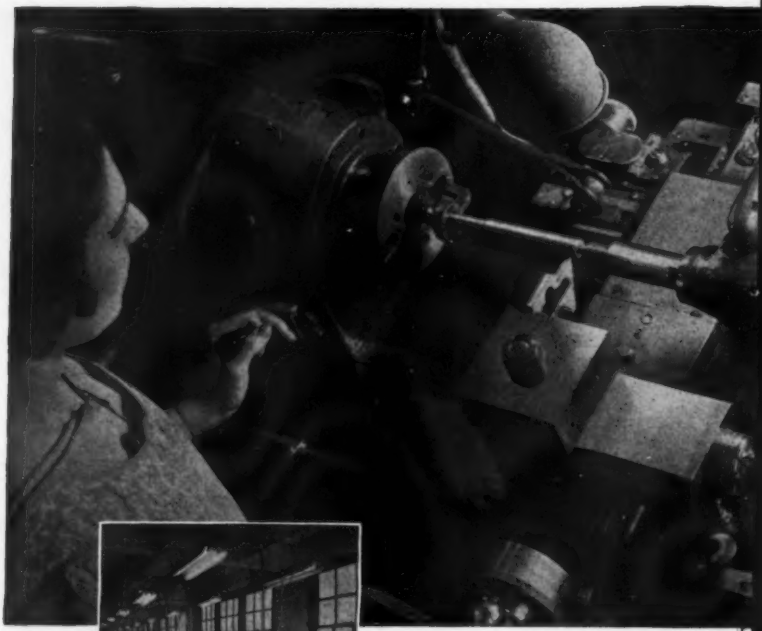
Some of the adaptations are interesting and stimulating, in their simplicity and effectiveness. A small plant made aluminum floor-waxers. Priorities had him on the ropes, running about 3 days per week. As part of the York pool, boring gear-housings for anti-tank guns now keeps this plant humming 22 hours daily. The plant had a 5-spindle drill press, formerly used to bore waxer-housings. By installation of a special chuck, the machine is now going great guns. With 5 spindles, it can bore, ream and face. Furthermore the men who formerly assembled waxers, now are doing more precise work. Lathe-operators who formerly worked within .001", now successfully handle tolerances of .0001".

"Do what you can

. . . with what you have," is the slogan of the York plants. Thus, a peacetime silk weaver is now chipping off surplus metal from axle-housing assemblies. Another installs gear covers. Workers as well as machines have gone all-out for war work, each doing what can be done with available skill and facilities.

Such is the spirit and inspiration in which America girds itself in this great world holocaust . . . a struggle which concerns vitally every American, and in which every American must find his place.

New Operators
TRAINED QUICKL



THE MONARCH MACHINE TOO

COMPANY · · · SIDNEY · OHI

OR HIGH PRECISION WORK

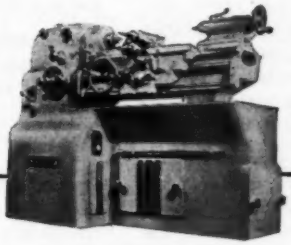
Chasing thread gage laps is one of the most accurate operations in gage work, yet within a few weeks after installing their first machine in this department, The Taft-Peirce Manufacturing Company of Woonsocket, R. I., is operating its entire battery of 16 Monarch Sensitive Precision Lathes with previously untrained help. In spite of this seemingly short training period, production rate is high, accuracy well within required tolerances, and the number of rejects surprisingly low.

To maintain production, the first Monarchs delivered were manned by experienced workers. One by one, new operators were carefully trained, and now have released these skilled men for other work.

This is one of many examples which prove the utility of Monarch Lathes. Simple and easy operation allows immediate production of many repetitive jobs by previously unskilled operators. Accuracy is so much a basic part of Monarch Lathe design that neither quality of work nor production rate suffers by such emergency measures.

Further—this is additional proof that even under present production pressure, there is no letdown in Monarch quality.

For thread chasing and heavier turning, Monarch Sensitive Precision Tool Makers' Lathes include a (6 to 1) back-geared unit as an integral part of the drive motor, operated from front of the lathe. This lathe permits bench precision accuracy and is designed for easy and convenient handling of work with less operator fatigue.



MONARCH LATHES

COVER THE TURNING FIELD

Surface Finish Standards

By WALTER MIKELSON*

THERE is widespread need at present for a practical, rapid, and reliable method for designation of machined surface finishes from both the design and production viewpoints. Raw materials and completed products must be manufactured in larger quantities than ever before, with no sacrifice of quality. This turn toward more efficient national production, and toward making the greatest possible use of our present production facilities, means that manufacturers who were heretofore entirely independent, are now cooperating and working together toward the common end of producing satisfactory products in the least possible time. Engineering ideas are exchanged, production facilities are combined, and subcontracting of machined parts is widespread.

Successful completion of a manufactured product having particular surface finish requirements, depends to a considerable extent upon clear understanding of surface finish requirements between manufacturers, and between engineering, designing, and production groups in any one manufacturing plant. An approach to this problem which General Electric Co. has used for the past 10 years, is that of describing these finishes with the aid of actual finish specimens. Not only has this method been found valuable in maintaining quality at low cost in our production equipment in the past, but now, more than ever, its value has become apparent.

Performance of a machined surface from the finish viewpoint, depends upon dimensional characteristics of surface irregularities. These characteristics can vary considerably and depend both upon the material and upon the method of finishing used. The most important characteristics are:

(1) Surface roughness.
(2) Surface waviness.
(3) Direction of irregularities in the surface plane.
(4) Pattern of irregularities.
(5) Surface profile.
(6) Contact area with mating parts.

As defined by the proposed American standard on Surface Roughness, (1) "surface roughness" is the rms height of the surface irregularities whose peaks are closer together than 1/32"; and "surface waviness" is the height of deviations whose peaks are farther apart than 1/32". The other terms are believed to be self-explanatory.

Instruments are now available which can be used to measure some of these characteristics and they should aid materially in obtaining much needed data on surfaces and their behavior. Of these, the most widely used are stylus

*General Engineering Laboratory, General Electric Company

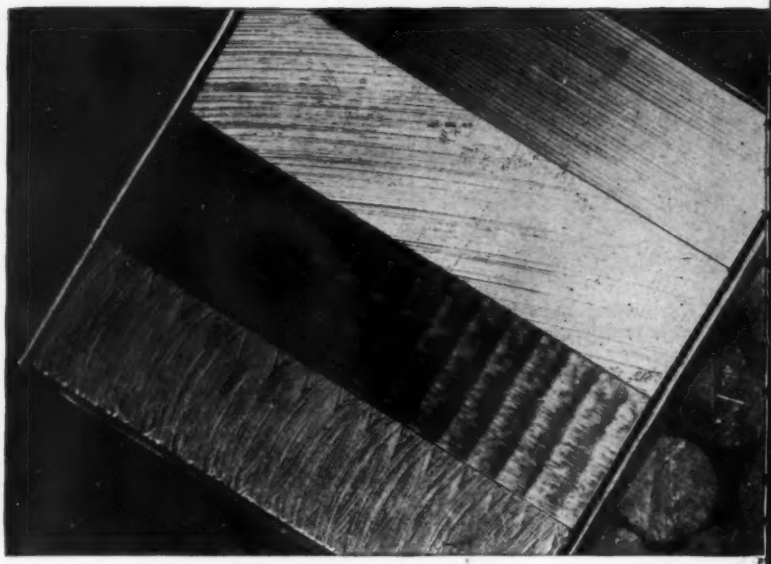


Fig. 1—Surfaces of 4 sample blocks of 18-8 Chrome Nickel Steel having the same order of magnitude of over-all RMS roughness.

or needle-type instruments which measure surface roughness as defined above. Although these instruments have proved themselves valuable when properly used, their use in production has in some cases led to the misconception that surface finish and surface roughness are synonymous.

Performance of a surface, however, depends not only on the roughness but to some extent on each of the several dimensional characteristics mentioned which describe the finish. The relative importance of each is dependent to a large degree on the use to be made of the surface.

Although little quantitative data are available and much more research work must be done on the effect of different finishes on performance, significant results have been obtained by a few experiments in the field. Dayton, Nelson, and Milligan (2) have obtained results on bearing performance of journals varying in roughness from 1 to 10 microinches, and these investigators observed no consistent correlation between performance and roughness.

Schurig (3) reported tests where a grit-blasted journal was compared with a polished and ground journal of one-third the roughness. When tested in an Almen machine, the grit-blasted journal was found to take three times the load of the ground specimen without seizing. Schurig also describes oil-lubricated bearing surfaces, dry rubbing surfaces such as collector rings on electric generators, stationary contact surfaces, and joints in which the various dimensional characteristics of a surface assume different degrees of importance.

The No. 40 Knight Miller

5-OPERATIONS PERFORMED AT ONE SETTING

- BORING
- MILLING
- SLOTTING
- PROFILING
- KEYWAY CUTTING

★ ★ ★

Today time is vitally important in winning the war. Every minute saved in production is a punch at the axis.

The No. 40 Knight Miller by performing these 5 operations at one setting, saves precious hours of down-time on many jobs. In addition, the special swivel and tilting table features save the use of many angle plates and cutters, and special fixtures. Still more time is saved.

The No. 40 Knight Miller has a wide range of capacity, fitting it for many jobs and uses. There are 16 different spindle speeds ranging from 40 to 1400 r.p.m., with reverse provided. 16 table speeds range from ½ — 12¾".

Write for further details

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Tests made by Shaw (4) suggest that a smooth surface is not always better than a rough one. This conclusion is based on load-carrying tests of metal-sprayed steel shafts having a porous surface compared with hardened steel shafts.

Wulff (5) points out that surfaces of the same material, finished by different methods but all measuring two micro-inches root-mean-square roughness, sometimes behave differently with respect to strength, friction, corrosion, and erosion. The susceptibility of material to fatigue failure is likewise considerably affected by many of the characteristics of the surface finish.

Practical instruments are not yet available which adequately measure all dimensional characteristics of a surface. More research work remains to be done before the importance of these characteristics to the performance of surfaces can be evaluated. In the meantime, some simple, practical method is needed to specify surfaces in design and production in a way which takes into account as many of the characteristics of the surface finish.

The G-E system makes use of sample gage specimens. In many respects it is similar to the system that has been announced by the Army Ordnance Department (6) except that symbols describing specimens designate a specific value of surface roughness, rather than a wide range of values for various applications.

The symbol used is an "f" with an attached number, for example, f^1, f^2, f^3. There are 10 degrees of roughness, varying in 2-to-1 steps from 4 to 2000 micro-inches rms. Each symbol may apply to one or more sample finishes, but all are machined to the same roughness on a metal specimen block, to illustrate differences in surface characteristics encountered in practice.

For example, two surfaces are represented on the smoothest specimen one of which is lapped the other honed. A group of 4 specimens having a roughness of approximately 125 micro-inches is shown in Fig. 1. The complete set of gage specimens is shown in Fig. 2.

These specimens are available to design engineers, draftsmen, shop mechanics, and inspectors. They are used:

(1) To indicate to the design engineer and to the draftsman the smoothness and appearance of various degrees of finish, and to permit the selection of an exact degree of

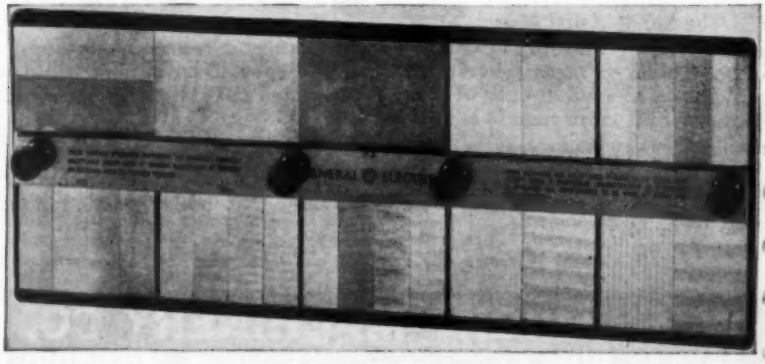
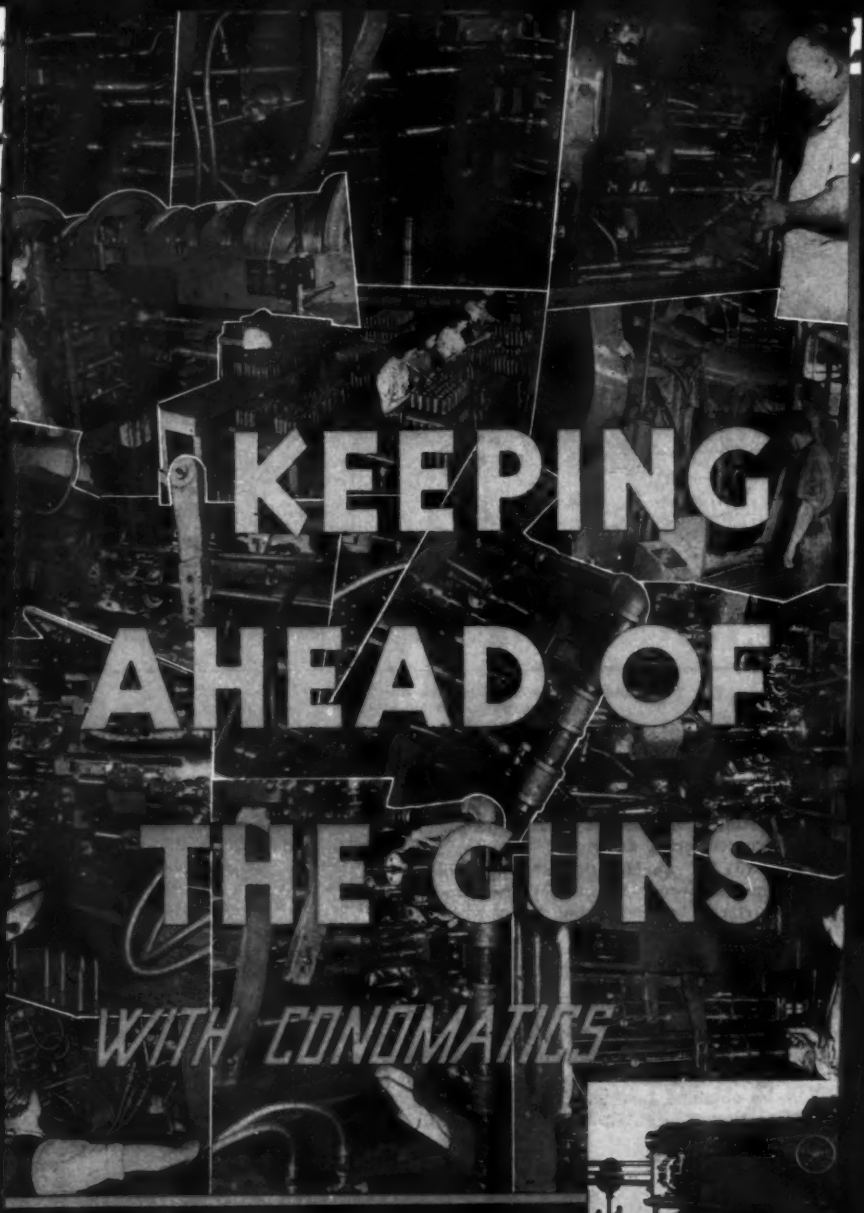


Fig. 2—The complete set of Machined-Surface-Finish specimens in panel.



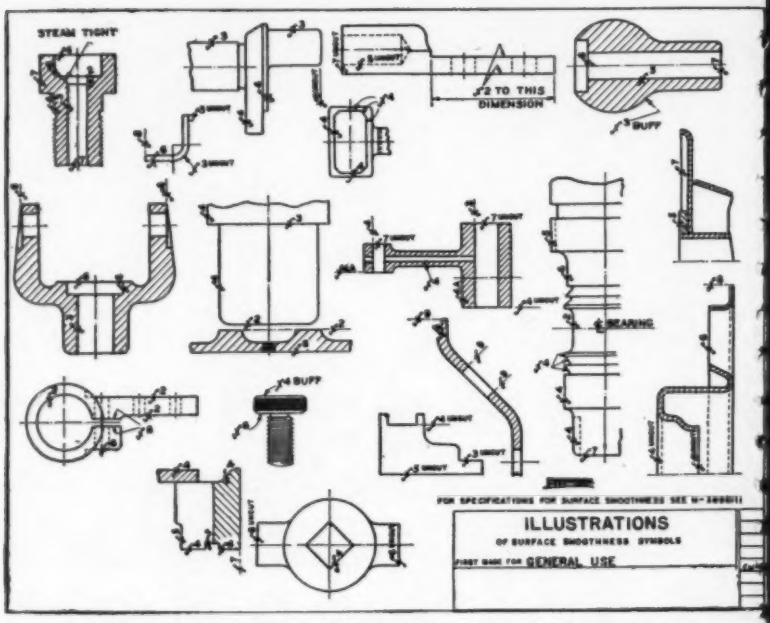


Fig. 3—Method of designating surface finish on a drawing. The proper "f" symbols are applied to the surfaces to be machined.

smoothness for the functional purposes intended.

(2) To enable the shop mechanic to visualize the degree of roughness designated on a drawing.

(3) To enable the shop mechanic and inspector to inspect the product surfaces by comparing them with the proper specimen.

The method of designation of surface finish on a drawing is shown in Fig. 3. The proper "f" symbol is applied to the surface to be machined. The "f^5 uncut" designation means that the specified degree of smoothness is to be obtained in the process of molding, casting, forging, punching, etc., without machining.

In general, the method of machining is not specified. Where this is necessary, however, the method is added to the numeral. for example 'f^4 buff." An instruction sheet on the correct method of use of these symbols is shown in Fig. 4. It will be noted that allowances have been made for any special cases which may arise.

In the inspection of machined surfaces the mechanic and inspector compare the finished surface with the gage specimen which most nearly approaches the appearance of the machined product. The method of inspection in all cases consists of comparison by sight and feel with the standard surface. The surfaces represented illustrate our standard "run

FINISHED SURFACES

FINISH SYMBOL ***	TYPICAL METHODS OF PRODUCING (DOES NOT INCLUDE ALL METHODS)	APPROX. REL. COST
✓ 1	GENERALLY HARDENED, GROUND, LAPPED AND/OR HONED.	100
✓ 2	GROUND OR TURNED SURFACE, LAPPED TO ELIMINATE TOOL MARKS OR DIE CAST, MOLDED, DRAWN OR EXTRUDED, ETC.	90
✓ 3	FINE GROUND, TURNED, SCRAPED, BURNISHED, PLANISHED, REAMED, ETC. OR DIE CAST, COINED, MOLDED, PUNCHED, DRAWN, ETC.	50
✓ 3½	FINISH GROUND, TURNED, REAMED OR SCRAPED OR DIE CAST, COINED, MOLDED, PUNCHED, DRAWN, ETC.	40
✓ 4	ANY MACHINE TOOL USING LIGHT CUT OR DIE CAST, MOLDED, PUNCHED, FORGED, DRAWN, ETC.	30
✓ 5	LIGHT FINISH TOOL CUT, MEDIUM GROUND, FILED, PROFILED, PLANISHED, BROACHED, COUNTER BORED, SPOT FACED, ETC. OR DIE CAST, MOLDED, PUNCHED, SAND CAST, FORGED, DRAWN, ETC.	20
✓ 6	FINISH TOOL CUT, MEDIUM GROUND, FILED, PLANISHED, DRILLED, PROFILED, COUNTER BORED, SPOT FACED, ETC. OR FORGED, MOLDED, DIE CAST, SAND CAST, ETC.	15
✓ 6½	TOOL CUT, ROUGH GROUND, TURNED, DRILLED, FILED, SAWED, COUNTER BORED, ETC. OR FORGED, MOLDED, DIE CAST, SAND CAST, PUNCHED, ETC.	10
✓ 7	TOOL CUT, ROUGH GROUND, SAWED, BLANKED, NIBBLED, ROLLED, FLAME CUT, ETC. OR FORGED, MOLDED, DIE CAST, SAND CAST, ETC.	5
✓ 8	ROUGH TOOL CUT, PARTING CUT, SAWED, SHEARED, FLAME CUT, NIBBLED, ETC. OR FORGED, MOLDED, SAND CAST, PUNCHED, ETC.	3
✓ 9	FLAME CUT, SHEARED, CHIPPED, ROUGH FORGED, ETC. ROUGHER THAN ✓ 8, BUT NOT MORE THAN TWICE AS ROUGH.	1

FINISH SYMBOL SIZE

△ WHERE "UNCUT" IS USED WITH THE "✓" NUMBER IT IS TO BE INTERPRETED THAT THE SPECIFIED DEGREE OF SMOOTHNESS IS TO BE OBTAINED IN THE PROCESS OF MOLDING, CASTING, FORGING, PUNCHING, ETC. WITHOUT MACHINING AND THEREFORE NO "STOCK ALLOWANCE" SHALL BE PROVIDED.

SPECIAL PURPOSE SURFACES

THE TERM "SPECIAL PURPOSE SURFACE" IS USED WHERE THE RESULTANT SURFACE IS A STANDARDIZED BASIC SURFACE PLUS AN EXTRA OPERATION OR PROCESSING, OR WHEN THE BASIC SURFACE IS A PART OF A SPECIALLY PRESCRIBED PROCESS, OR WHEN THE PURPOSE IS UNUSUAL AND NOT LIKELY TO BE UNDERSTOOD AS GENERAL TRADE PRACTICE, ETC.

SUCH SPECIAL PURPOSE SURFACES APPLY ONLY WHERE A BASIC SURFACE DOES NOT MEET THE REQUIREMENTS.

THE FOLLOWING EXAMPLES ILLUSTRATE SOME METHODS OF INDICATING SPECIAL REQUIREMENTS OR OPERATIONS IN ADDITION TO THE ✓ NUMBER:

✓ 4 S.I. 1196	WHERE UNUSUAL DEPARTMENTAL REQUIREMENTS OR SPECIAL INFORMATION IS SPECIFIED BY SUPPLEMENTARY INSTRUCTIONS.
✓ 7 MACHINE FLAME CUT ✓ 4 UNCUT △	WHERE ENGINEERING INSTRUCTIONS FOR SPECIFIC AND WARRANTED REASONS, RESTRICT THE METHOD OF OBTAINING THE REQUIRED FINISH TO ONE WAY OR ONE PROCESS.
✓ 5 POLISH ✓ 5 BUFF ✓ 5 MIRROR ✓ 5 SCRAPED	EXTRA OPERATIONS OR FINISHES MADE ON THE BASIC SURFACE.
✓ 7 PAINT	WHERE THE ULTIMATE PURPOSE OF THE SURFACE IS GIVEN TO OBTAIN THE BASIC SURFACE AT THE LEAST COST.

***

NOTES

NOTE 1: THE QUALITY OF THE FINISHED SURFACE DESCRIBED BY THE FINISH SYMBOL IS DEFINED BY APPROVED SPECIMEN PIECES WHICH HAVE BEEN PREPARED.
NOTE 2: THESE SURFACE SPECIMENS REPRESENT THE ROUGHEST SURFACE ACCEPTABLE UNDER EACH "✓" NUMBER REGARDLESS OF METHOD OR MATERIAL USED ON THE FINISHED PRODUCT. FINER SURFACES ARE ACCEPTABLE IF MADE AT NO EXTRA COST EXCEPT WHEN A PARTICULAR CHARACTERISTIC OF A SURFACE IS SPECIFIED. (THE USE OF THE SYMBOL "A" WITH THE FINISH SYMBOL TO INDICATE AN UNCUT SURFACE IS NOW OBSOLETE. WHERE IT HAS BEEN USED, AND DEFINITE PLANNING INSTRUCTIONS ARE LACKING, CHECK WITH THE RESPONSIBLE APPARATUS ENGINEER).
NOTE 3: ALL COMPARISONS TO BE MADE BY VISUAL AND FEEL METHODS.
NOTE 4: THE RELATIVE COST OF DIFFERENT SURFACES SHOULD BE ESTABLISHED BY EACH PLANNING DEPARTMENT BECAUSE IT DEPENDS ON THE QUANTITES INVOLVED, THE MATERIAL, METHODS, AND MACHINES USED.
NOTE 5: WHETHER OR NOT TO ALLOW STOCK FOR FINISH DEPENDS UPON THE DIMENSIONAL TOLERANCES SPECIFIED, OR THE MACHINING REQUIRED, OR THAT WHICH EXPERIENCE AND PLANNING DICTATES.

SPECIFICATIONS FOR SURFACE ROUGHNESS

Prepared By

GENERAL ELECTRIC

M-3895III

D.G.

of the mill" finishes. When finishes differ widely in appearance from the sample shown, special gages are made up. They are numbered in the same manner as the standard set and are built to measure the same roughness.

Continued use of this system for the past ten years has accelerated production planning and tooling, and promoted uniformity and interchangeability of parts at minimum cost and delay. We recognize this as a practical step for present production needs and offer it as a suggestion to those who may have similar surface finish designation and inspection problems to solve at this time. Merit of the method lies in the fact that it accurately protrays many of the dimensional characteristics of a surface. A sample finish specimen is actually representative of the finished product and, hence, most useful to design and production personnel, and simple to interpret.

REFERENCES:

(1) A Proposed American Standard on "Surface Roughness" was developed by the Sectional Committee on Classification and Designation on Surface Qualities B46 under the auspices and procedure of the American Standards Association and was issued for a trial period not to exceed two years. It was published March, 1940, by the A.S.M.E., 29 West 39th Street. New York. N. Y.

(2) "Surface Finish of Journals as Affecting Friction, Wearing-In. and Seizure of Bearings" by R. W. Dayton and H. R. Nelson, and L. H. Milligan, presented at the Cleveland Convention of the American Society of Mechanical Engineers on June 8, 1942.

(3) "How Should Engineers Describe a Surface?" by O. R. Schurig, Mechanical Engineering, October 1940.

(4) "Metal Sprayed Surface in Relation to Lubrication," by Harry Shaw, a paper presented at Manchester, Oct. 20, 1937, and reprinted by Metallizing Engineering Co., Inc., 21-07-41st Ave., Long Island City, N. Y.

(5) "Friction, Fuzz, and Hairy Oil," by John Wulff, Technology Review, May, 1940.

(6) "Standards for Ordnance Finishes," by Mary R. Norton, presented at the Cleveland Convention of the American Society of Mechanical Engineers on June 9, 1942.

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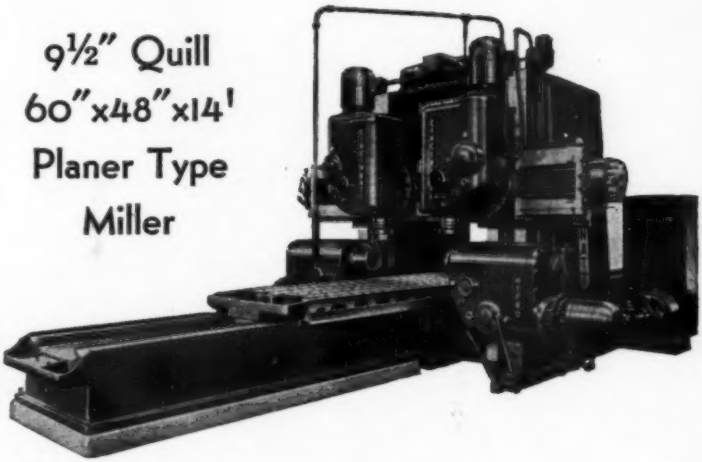

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SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

The Foremanship Forum

By EDMUND MOTTERSHEAD

Part II—Some Personnel Problems

WEBSTER defines personnel as "the persons employed in any business . . . ." From that we might reasonably construe personnel problems as including almost anything that can happen among people working in a place. To the foreman, it can mean almost anything pertaining to men under his supervision.

However varied they are in detail, many problems of the foreman boil down to one thing:—A new foreman in a machine shop in Wisconsin asks:—**"What is the greatest single problem a foreman faces?"**

Putting the right man on the right job. That is not only your greatest problem, but successfully accomplishing it also solves many other smaller problems by eliminating them altogether.

This same inquirer goes on to ask:—

"I have several men apparently unsuited to their jobs. I am changing them around, but I wonder if you can tell me how they got on the wrong job in the first place? Maybe I can avoid that in the future."

One agency which has given very serious study to this very problem lists 6 major causes contributing to improper placement of workmen. One of these, and the only one for which the foreman is not responsible, is lack of suitable workers for the job . . . a local scarcity of skills, for example. The other 5 causes for having the wrong men in the wrong jobs, can all be put squarely in the foreman's lap:

(1) Simple failure due to incompetence on the part of foremen. Having the wrong men in the wrong jobs would just be part of a general pattern of inability to act as a foreman.

(2) Partiality, or favoritism on the part of foreman. It might be, for example, that a job in question pays fairly well, and the foreman put his brother-in-law on it to keep his wife quiet altho he knew that the brother-in-law couldn't handle the job. It might be a friend, a relative, somebody to whom he owed money . . . there are plenty of reasons for favoritism, and thus plenty of opportunities for the foreman knowingly to have the wrong men on the wrong jobs.

(3) The foreman might be short on technical knowledge of the job, himself. He might not know the requirements of the job, what physical strength it demands; what mental aptitudes are necessary. A small matter such as the size and shape of a worker's hands on an assembly job could make a lot of difference in production. A man might look able-bodied and still be unable to do much heavy lifting. Any foreman who so desires, can correct this by making a thoro analysis of each job in his department.

(4) Every so often, a worker comes in and claims to have had such-and-such experience, is put on a job, and is discovered to have little or no knowledge about the work. To a cer-

tain extent, this situation is due to the fact that employers generally require experienced help. The newcomer wonders how he is going to get experience if he doesn't start, and thus fakes the experience for a chance at the job. It is a common notion that one need not be shy about experience and background to get a job anyway. I maintain this is the foreman's fault because with only 2 or 3 well-directed questions he can determine definitely whether the applicant has experience or not, and can thus avoid the waste, machine breakage or accidents that often result. A simple technical question regarding coolants, the color or nature of the metal shavings, the type or cutting speed of the tool, or many other things, reveal to an expert whether the new man really knows anything about the job.

An outstanding case of this so-called misrepresentation by the worker, which I call stupidity on the part of the foreman, happened in a machine shop in Western Illinois not long ago. A man applied for work and asserted that he had several years of miscellaneous experience as a mechanic. Among other things he said he knew how to run an engine lathe. The foreman asked him where he had learned to run the lathe. The man replied that his uncle had an old South Bend in the back of his garage. The job-seeker had taught himself to run the lathe. As it was fairly possible that the man could do something on a lathe, the foreman let it go at that. Notice . . . he took the worker's word for lathe-ability without inquiring further. So, about a month later, the foreman was in a hurry to have half-a-dozen little steel pins turned out; pins maybe ¼" in diameter and 1" or so long, turned to limits of .01". He asked the man if he could handle the job. "Sure," he could! Note again that the foreman didn't ask him anything specific. About 2 hours later, the foreman came back and found the

man sitting at the lathe with his feet propped up against it, still working on the first pin, turning off about a thousandth at a time. What did the foreman say? Well . . . but it was his own fault. He could have asked the man in the first interview what, specifically, he had actually produced on a lathe. He could have asked him 2 hours previously, when he gave him the bar stock for the pins, how long he thought it would take to do the job. Misrepresentation? Maybe, so what? It was the foreman who did not actually find out what the man really could do.

(5) Indifference on the part of the foreman to the jobs, to the men, and to production is a cause of having the wrong men on the wrong jobs. Every so often you run into a foreman, like a worker, who just doesn't care what happens as long as he can keep the boss more or less satisfied and draw his pay.

As a foreman, thinking over your own problems, you face cold facts . . . or should. The order of the day is:—"get somebody on the job who will produce!" That means the right men on the right jobs in your department. Look around you. You have certain jobs and machines (work stations if you like the term better) and a man of some kind on each. The first thing to do is to use the men you have to best advantage. It usually costs too much to replace them, and the replacement might easily be worse these days when skilled labor is scarce.

You will find in your department 3 situations or 3 types of workers:—Fits, Misfits, and Unfits. Let's hope that they are all fits . . . men who produce a maximum amount of good work, are interested in their jobs and in the department; are satisfied with conditions, want to know more, want to cooperate, and make practical suggestions to help.

Misfits are the men who were mis-

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Safeguard your production from the scrap pile

Quick production is not your only problem. Machine tools may be speeded up, hours saved by better set-ups, over-time and extra shifts may be installed. Yet this will be of no avail or benefit if the accuracy of your product is lost with your material ending on the scrap heap. The best investment for any shop is in inspection tools to detect and eliminate the errors at the source before they can affect production.

Give your men the right tools to measure with. Remember that whether you manufacture to close tolerances of "tenths" or to wide tolerances of plus or minus .002", you must still start with the basic accuracy in tenths of thousandths or else your work will not interchange with that produced in other shops.

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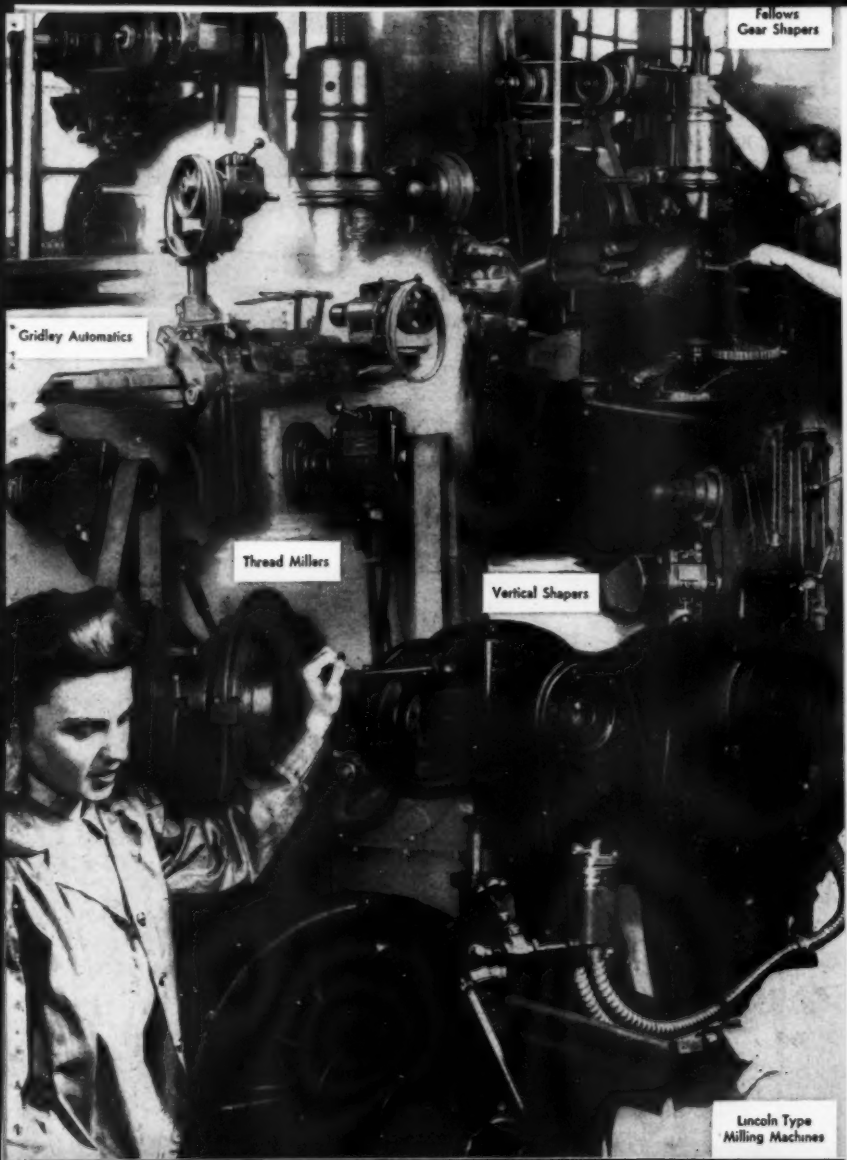
placed because of any one of the reasons mentioned. Many men are really trying hard but don't seem to be achieving any results. They work hard all day. They are fairly honest. You must remember that their good intentions and good efforts are assets to your department, which cannot be bought as you buy skill and time, and these men should be studied carefully and dovetailed into your production pattern.

The unfit is not always unfit for his job, but possibly misfit. However, there are a few who are congenitally lazy, chronic disturbers, nervous, violent or irresponsible. When such men cannot be shifted to other jobs in the department, or cannot be given suitable work in other departments, they should be discharged for the good of the organization.

One company uses a convenient record-card for each worker, kept by the foreman to aid in solving just such problems as this. It is set up on a 5½x8½" card, printed front and back, with enough blank spaces to be flexible in handling and to give considerable information about each worker. It is reproduced. The back of the card, containing the job skill record, is also useful to the foreman in solving production-planning problems as they come up, finding a man who can do a certain type of work without removing someone else from a critically important work station etc.

In using this card, foreman collects information about the worker's personal life. A few casual friendly visits with the worker are sufficient to obtain the information and at the same time establish the foreman in the worker's mind as having a personal interest in him. During these visits, it is easy for the foreman to obtain definite impressions about the worker's personal traits. The ratings from plus 5 to minus 5 are purely arbitrary in the



(FRONT)

DATE _____

NAME _____ CHILDREN? _____

DATE OF BIRTH _____ MARRIED? _____

MISC. PERSONAL INFORMATION _____

HEIGHT _____ WEIGHT _____ HEARING _____ SIGHT _____ TEETH _____

PHYSICAL CONDITION _____

PERSONAL TRAITS RATING

	-5	-4	-3	-2	-1	AV.	+1.	+2	+3	+4	+5
Experienced											
Skilled											
Strong and Husky											
Ambitious											
Pride in Work											
Mental Quickness											
Understanding of English											
Handy											
Even Disposition											

(REVERSE SIDE)

JOB SKILL RECORD

MACHINE	OPERATION	EXPER. TIME	REMARKS

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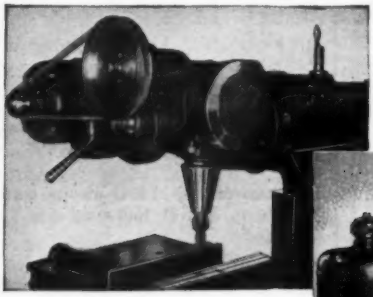
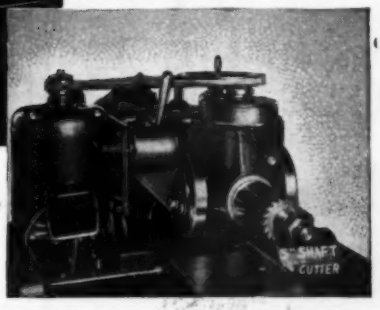


SHAPER MILL WITH SPINDLE IN VERTICAL POSITION



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The BRAUER UNIVERSAL SHAPER MILL provides the solution to one important problem in the present machine-tool shortage, that of obtaining sturdy, dependable milling machines.

Twelve or more spindle speeds of from 60 rpm to any speed required may be obtained by interchanging pulleys on motor and mill. Easily fitted to different sizes of shapers; light in weight, small in size, making it ideal for shops in ships and portable shops having a shaper available.

Built to handle any type of milling work. The spindle bore is No. 4 Morse taper with socket for end mill work and for 1¼" and 1" arbors for ordinary milling. The machine may be turned for milling through an angle of 90°. Motor and spindle are so arranged that the Shaper Mill may also be used for grinding.

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mind of the foreman, but by applying it to the whole department, a comparative rating is established in the mind of the foreman, so that when a particular need arises or a special problem is met, he has in his mind . . . or in his file if he wants it . . . a more or less complete inventory of the personalities and abilities of his men.

A foreman in a middle-western railroad shop writes:—**"There are two men in my department who have been with me for several years. They are supposed to be mechanics. Yet I have to stand over them all the time to see that they do a thing right. I hate to say they are falling down on the job and fire them, but it looks as tho I shall have to."**

That, of course, is a decision you have to make yourself. However, when a workman seems to be falling down consistently on his job, there are several things you might consider, viz., his health and mental condition. It may be that a simple and often-overlooked condition such as anemia might be at the bottom of inattentiveness and consequent need of constant supervision. It might be an unknown deafness or failing eyesight which the worker would be the last to admit. It might be a condition in his home which brings on chronic worry to the point where the mental effort necessary to do his work properly is impossible. Age is a factor. Sometimes increasing age means increasing stubbornness, clinging to old practices. Sometimes it means shaken confidence as younger men are seen to perform better and faster. Sometimes shaken confidence is covered up with increasing irritability and stubbornness. It is certainly not enough to judge by surface indications.

It may be that condition of the machinery and equipment is a contributing cause. Quality of the raw materials may not be up to standard.

I'm not making excuses for the

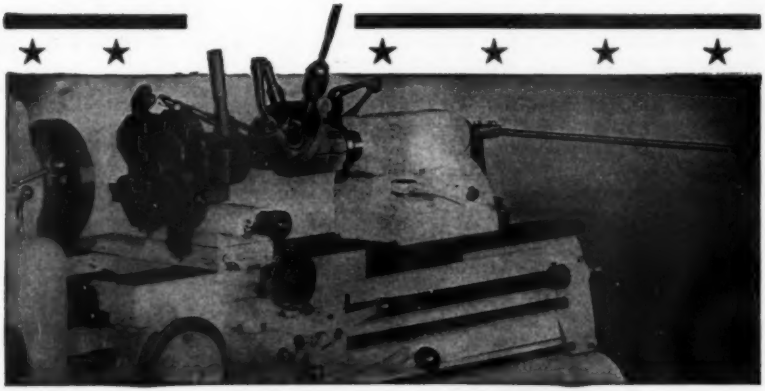

Photo above shows Jefferson Turrets on 16" lathe

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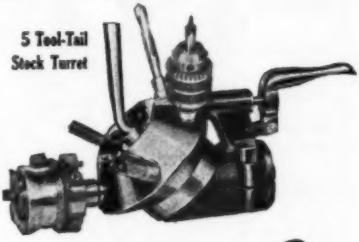

5 Tool-Tail Stock Turret

Yes, it's as easy as that! You simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.
The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

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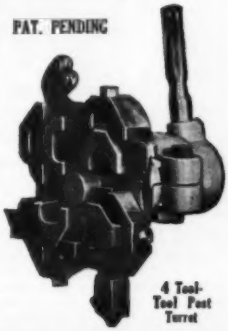

4 Tool-Tool Post Turret

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Write for further details, also literature on the Jefferson Precision Milling Machine, Milling Machine Dividing Heads, Vises, Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.

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worker, but you have to remember one thing:—When you have personnel problems, or for that matter, other problems in your department, few of them are occasions for praise or blame. Fixing of responsibility followed by penalties ranging from "giving him heck" to firing the worker is not the answer. Your function is that of the family doctor, confronted with any number of ailments . . . (1) Diagnostic, to discover the real trouble and its cause . . . (2) Curative. And thruout, the whole business should be treated impersonally.

What are the shop working conditions? Is there something consistently hazardous about the job that could make the worker nervous? Are there minor irritations such as unnecessary dirt, rough spots on the bench or splinters; does he have the right tools, etc.? What about overwork? Is the worker the right man for the job?

And what about you . . . do you always keep your promises to the men. Failure in this respect is a great destroyer of confidence and morale and cuts into workers' production and efficiency. I know one man who used to brag that he only made 2 kinds of promises in his life:—those to his landlord and those to his wife. The landlord he paid in advance, and his wife made sure he kept the others. Other than that he never made any promises. Which is a sound policy unless you have a good memory to go with the good intentions.

A foreman in a Connecticut paper mill writes about a problem which many foremen have faced:—**"In our work here we have a special sort of problem. ..The men are working with heat and with chemicals and with large equipment. ..Certain jobs require considerable skill and yet are definitely unpleasant, so that we have some trouble getting men to stay. ..Have you any suggestions that might help?"**

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There are several things you can do, limited only by the nature of the job itself, and by company policies which you might have no part in forming A good many workers will be satisfied with definitely unpleasant jobs if the pay is high enough. I happen to have a friend who is a welder in a company which makes large storage tanks He spends 10 to 12 hours a day inside these tanks, welding in temperatures often around 140 F. This involves discomfort and danger. Many times these tanks have to be cleaned of all gases by steam before he enters for repair welding, which only increases the discomfort. But he receives $1.40 an hour with time-and-a-half overtime, and can work all the overtime he wants. His company also furnishes him the best possible equipment, which is another thing to be considered. It also provides whatever safety devices procurable, has ready at all times a first aid specialist, respirator, etc., to handle emergency cases. The company also makes it a point to select only men young enough, alert enough, small and agile enough, to handle the jobs well. It studies the men's physique, mental attitude, reactions to danger, speed of reflexes, background, environment, etc., to obtain the men best suited to handle the jobs under the unpleasant or hazardous conditions. Companies which provide window-cleaning service for large buildings, for example, almost always require small, agile men for outside duty.

There are two other things you may do. You can vary the routine of the job Or, perhaps, find a worker on another job who is equally suited to the less desirable one and have the 2 alternate at intervals.

Above all, you can give the men all the encouragement you are able to, show them good will at all times, cheer them on, and indicate your sincerity in trying to do what you can to make

IN PRODUCTION AND COMBAT

AAF FILTERS protect our fighting planes from DUST

The whole story of the part which Dust Control plays in enabling industry to keep abreast of war production demands can't yet be told.

Only the men behind the scenes, and the American Air Filter engineers who have been responsible for designing and installing the equipment, know how vital adequate dust control is to maintaining deliveries and worker efficiency.

The aircraft industry is typical. Not only does clean air speed up delivery of planes but it also plays an important role in keeping them flying. AAF airplane engine filters are saving valuable replacement parts, reducing oil and gas consumption and lengthening the periods between overhauls.

If dust is a problem in your plant——write us. We can help you too!
Send for free booklet "AAF in Industry."

AMERICAN AAF AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE., LOUISVILLE, KY.

IN CANADA: DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

conditions better for them. Remember that the most important man in the plant, so far as the worker is concerned is himself . . . nobody else. Whatever you can do to show him that you are trying to be helpful in his interests will help keep him satisfied on the job, even tho it is an unpleasant one.

A new foreman in an aircraft plant in California writes:—**"Last week I was made a foreman, a promotion I am very proud of, in a plant like this with thousands of employees. I want to start right with this bunch here. I want to get their cooperation and friendship so we can work in harmony. The war work we do here is very important, and I have a stiff production quota to work on. What is the best way to start?"**

By taking a personal interest in the men under you. Let's get a little more of the picture. You have been moved up to a position of considerable responsibility . . . promoted because you displayed sufficient mechanical skill and technical knowledge plus ability to lead men under you. You have before you materials, tools, machines . . . these you know from experience. You have also a group of men . . . these you may not know at all, or only to some limited extent, if you have been working in that department or on that same shift.

Each of these men is a complex of racial traits, characteristics, beliefs, prejudices, physical and mental abilities, temperament, laziness, love of family and home, and a host of other things. Regardless of that, or possibly even because of that fact, you, as foreman, are going to develop and direct that group of men into a working unit capable of solving and meeting any and all of your department's problems. Where you are short on technical skill or knowledge, you will have a capable lieutenant who can supply the lack. Where you are stumped for an idea,

AN OLD LESSON

...*with new importance!*

If the grinders you now have are not giving "top performance," check on the spindles . . . chances are that installation of Ex-Cell-O *precision* spindles alone will return your grinders to their former usefulness.

EX-CELL-O CORPORATION • DETROIT

XLO

EX-CELL-O PRECISION

Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DIESEL

you will have half a dozen fellows come out with suggestions to help. Where you are limited in strength and endurance, you will have a hundred men behind you. That is your big job.

The first thing is to get to know your men. You can't stay off at a distance from them and get them to pull together for you. Knowing each man's peculiarities, his strong and weak points, is essential to molding the whole force into an effective working unit. By getting close enough to the men to study them, you find also that you get a picture of yourself as they see you . . . which is vital to successful relations with them.

Let's look at these men. I don't know them; I haven't seen them. But I know that they are like any similar group of workmen anywhere. They want, first of all a chance for advancement and a chance to make more money . . . possibly a chance to work at a more pleasant or more interesting job. Why? Because most of them will have more or less of a family, rent to pay. grocery and doctor bills, clothing to buy, and some means of amusing themselves and their families. Remember when you were a worker and somebody else was the foreman? Working conditions also interest them. How clean and convenient are the toilets? What about a little fresh paint here and there to brighten things up? It does wonders for their spirits. Security on the job is also something in which they are vitally interested. Not only how the job will last (as evidenced by various slow-downs etc. in the past to make the work last), but also are they in constant jeopardy of being fired due to some whim of an irascible boss? Is the foreman even-keeled so that they don't have to worry about it as long as they do their work satisfactorily? Personal health is probably the greatest single interest of the average American adult. The Meridan

The New LIBERTY

★ ★ ★

VERTICAL HIGH SPEED GRINDING ATTACHMENT

The NEW LIBERTY high speed grinding attachments are designed for quick simplified setups in order to maintain the best possible results in the tool room. They are excellent for grinding gages, angles, slots, recesses, and surfaces which are either impossible to get at with a large wheel or require difficult and expensive setups in which small wheels are a necessity.

Designed for the most accurate service in grinding tools and various kinds of mechanical equipment.

SEND FOR CIRCULAR GIVING FULL DETAILS.

Liberty TOOL AND GAGE WORKS
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Survey proved that. Not only the condition of their jobs as they affect health interest them, but also workers will appreciate a little display of personal interest in any other conditions . . . eyesight, bad sprains, a little sympathetic discussion of mutual experiences with false teeth . . . the old gag about the woman talking about "her operation" is based upon a fundamental human characteristic. People not only like to talk about themselves, they like to talk about their own health best, food and sex next, and amusements and hobbies third. Another thing the typical worker is interested in is obtaining the confidence of his boss and employers. This is a particularly crucial point. Confidence involves trust. The worker demands that you place your trust in his skill and knowledge and also in his integrity and intention to do the job to the best of his ability. I have heard literally hundreds of complaints about workers who require constant supervision and who have to be told to do a thing and how to do it, over and over again, and I am convinced that at least 90% of it is due to the fact that in the first instance, the foreman did not show any sign of trust or confidence. Consequently the worker never felt that he had any responsibility to show what he could do.

Fault is often found in executives in all walks of life. The hallmark of a capable executive is ability to build lieutenants or junior executives under him who will carry the responsibility and get things done. I know a man who happens to be in the landscape business, employing several older men as his gardeners and workers, and one highly skilled and trained horticulturist as his foreman. He issues orders to the foreman who transmits them to the men and starts a job. The next day the boss is on the grounds, per-

The Murchey Type "M" Collapsible Tap is designed to be used either as a rotating or non-rotating tool. Fast in action, positive in adjustment and accuracy guaranteed—

The MURCHEY TYPE "G" Non-Rotating Self-Opening Die Head is designed to be used on hand screw machines, with a suitable range of size adjustment into all MURCHEY heads.

OTHER MURCHEY PRODUCTS
Thread Milling Machines
Shell Tapping Machines

MURCHEY MACHINE AND TOOL CO.
DETROIT, MICHIGAN

sonally supervising everything, changing his mind, bawling the foreman out in front of the men because the foreman hadn't done the work correctly when all the foreman did was to follow original orders. He never lets the foreman exercise authority without immediately following up orders to the foreman by doing the foreman's work himself. I used to talk this over with him, and he would reply;—"Yes, that's so. But it is very risky business, trusting somebody to do something for you." He was simply afraid that the other fellow, regardless of skill or integrity, wouldn't do what he wanted just right . . . and the worst of it was in that case that the boss himself didn't know what he wanted half the time.

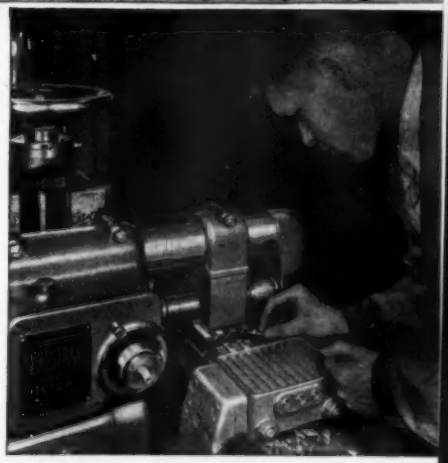
How, then, are you as a new foreman going to give the men the feeling that you have confidence in them?

In the first place, most of them were already working there when you came on the scene, and it is reasonable to assume that the majority of them know **something** about their jobs. The only thing you can do about their job-skill at present is to watch what happens for a while and check performance and skill. BUT, at the outset, you must, and I mean **must**, show the men that you have every faith in their **intention** to do the best they can, in their integrity. The point is, that for the sake of ferreting out a few deadheads, you cannot afford to spoil the bulk of the good workers in the department. Sooner or later you can get rid of the poor ones, but if your conduct is determined by your action against the undersirable element, rather than by your actions for and with the desirable element, you will have a tough time. It is the difference between the American system for which we are fighting and the Gestapo. We

Milling 1800 Pieces an Hour

ON PARTS LIKE THIS →

Sundstrand Engineered Production on Standard No. 00 Hydraulic Rigidmil illustrated nets 1800 pieces an hour milling slots in small brass parts. Slots are 0.057" wide ± 0.002"; 0.281" deep ± 0.001"; 1½" long. Same machine, with suitable changes in fixtures and cutters, can give similar high production on wide variety of other parts.



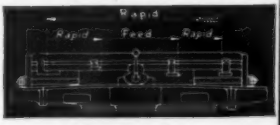
No. 00 Rigidmil Has Everything

For High Production Small Milling On Bombs, Fuses, Firearms, Instruments, Pumps and Similar Work

Speeds for Everything . . . High-ratio head of No. 00 Rigidmil is made in two speed ranges, each having 64 spindle speeds — Type A, 57 to 2416 r.p.m.; Type B, 85 to 3600 r.p.m. — for best milling in everything from steel to magnesium.

Feeds for Everything . . . Sundstrand Hydraulic Feed Unit gives any desired feed from ½" a minute to 37" a minute; or optional range from 1¼" to 65" a minute.

Cycles for Everything . . . Hydraulic feed and rapid traverse at 400 inches a minute gives fast, accurately controlled, one or two-way, continuous or semi-automatic table cycles; provides high production at a minimum of operator effort. Easily adjusted standard dogs establish all usual table-cycles. Sundstrand Engineered Production Department will recommend special dogs and cycles for unusual conditions. Diagram shows cycle for above job; uses three standard dogs and one special.



Early Deliveries . . . Standard No. 00 Hydraulic Rigidmils are available for early delivery. Write for full information.

GET FREE BOOK →

Get complete information about many exclusive advantages of Sundstrand No. 00 Rigidmil by writing for booklet shown at right. Ask for Bulletin 405.

SUNDSTRAND MACHINE TOOL CO.

2535 ELEVENTH STREET, ROCKFORD, ILLINOIS, U. S. A.

talk a lot about the abuses which arise under our democracy, and about the slowness with which the evils are corrected. But in the meantime, the rest of us have our rights and privileges . . . which we would not have under a system specifically designed to give somebody power to cure all abuses immediately and out of hand. Think it over. You are working in a war industry, producing for a conflict carried on by the brothers and uncles and nephews and sons of the men in your department . . . carried on so that these same men can have certain liberties.

See that they have those same liberties while working. Confidence begets confidence. Suspicion begets deceit and fear. And fear begets more fear and disaster.

Personnel problems, as indicated in the foregoing, cover a multitude of things. But 3 things the typical foreman can do to aid himself thruout.

(1) See that as far as possible, the right man is on the right job, from the standpoint of his physique, his abilities and his disposition.

(2) Take as great a personal interest in your men as time and your own disposition will permit.

(3) Remember that your men are also human beings, and deal with them according to those impelling motives and desires which are common to all humans.

(To be Continued)

AFTER THE EMERGENCY ...What?

TODAY the emphasis is on production. And it's natural to think of machinery mainly in terms of *temporary* output. ut don't forget the emergency will some- y be over. What then?

With the sellers' market gone, with com- etition keener than ever, then is when the *sting* quality of really fine equipment will y its greatest return.

Haskins Tappers bought today for war me production are *standard* machines— qually suited to high-speed precision per- rmance on peace time work. A few quickly ade adjustments—perhaps an inexpensive hange in the holding fixtures—and ur Haskins Tappers will be ready help you hold *down* peace time oduction costs — so that you keep sales and profits *up!* G. Haskins Company, 624 S. alifornia Avenue, Chicago.

TODAY: This two-spindle Haskins Tapper is tooled for war time needs on aluminum fuse bodies.

TOMORROW: Being a *standard* machine, the change-over to private industry production can be quickly and inexpensively made.

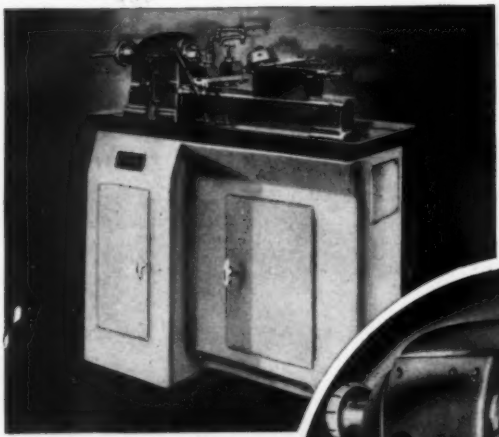
HASKINS

HASKINS
Precision
TAPPING EQUIPMENT

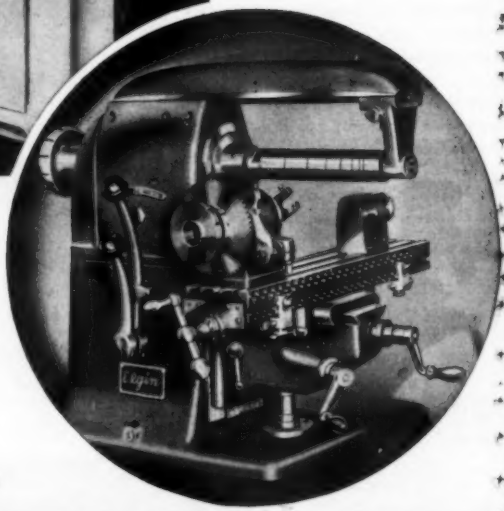
TWO NEW BOOKLETS—(1) "Holding Fixtures for Haskins Tapping Machines"—contains many new ideas; (2) "Percent of Thread Chart"—gives much valuable information. Send for either or both.

ELGIN PRECISION

Elgin's contribution to America's All-Out Victory Program includes Bench Lathes, Bench Milling Machines and Hand Screw Machines—high precision machine tools essential for the multitude of fine precision operations entailed by our revitalized war efforts.



Precision Hand Screw Machine

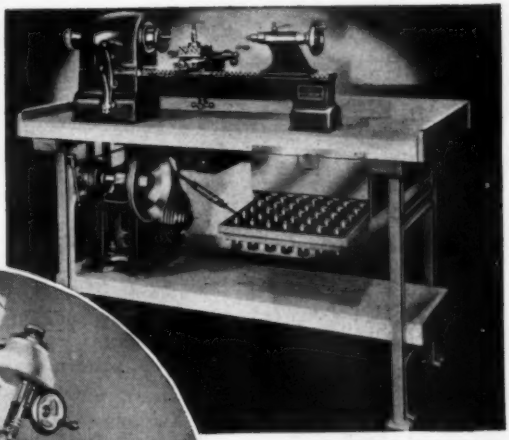


Bench Milling Machine

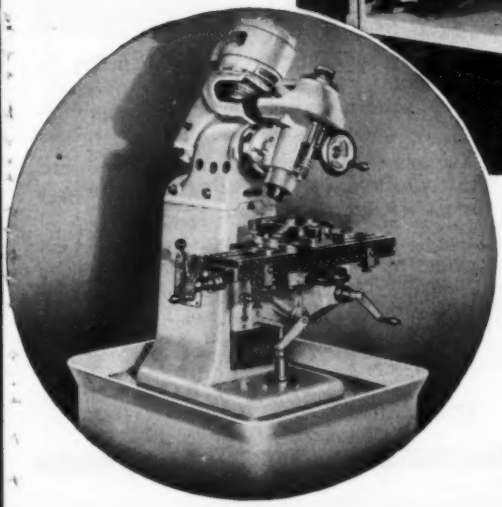
ELGIN TOOL

MACHINE TOOLS

You will find in all of these High-Precision Machine Tools, mechanical advances and improvements that permit fast and accurate work to close tolerances, plus sturdiness and all-around dependability. Sustained accuracy is assured by adequate design and painstaking care in construction.



Precision Bench Lathe



Vertical Milling Machine

WORKS 1772 BERTEAU AVE.
AT RAVENSWOOD AVE.
CHICAGO, ILLINOIS

Cleveland's Big Public Auditorium which will house the 1942 War Production Edition of The National Metal Exposition.

The War Production Metal Show

"PRODUCTION for Victory" is the keynote of the War Production Edition of the National Metal Exposition in Cleveland's Public Auditorium, Oct. 12-16, sponsored by the American Society for Metals in cooperation with the American Welding Society, The Wire Ass'n, Iron and Steel Division and Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

Mass dissemination of information and ideas at the show will answer many of the problems of production executives who are striving for maximum war production. Many firms have been working on products entirely foreign to their normal lines. They have had to work with new or improvised equipment, new metals, new processes and under closer tolerances. Meanwhile, Yankee ingenuity has developed speedier and better equipment, substitutes and alternates and the war effort will be helped by getting all these innovations and helpful ideas on the production lines without delay.

In addition to the exhibits, there will be many timely educational features. A 5-day lecture series will be held with meetings at 5 P. M. Conducted by James P. Gill, Chief Metallurgist, Vanadium-Alloys Steel Co., the meetings will be devoted to consideration of tool steels.

In addition to the regular technical sessions of the participating societies at which 100 outstanding papers will be presented, there will be other important meetings. These will present for discussion such vital topics as substitutes, salvage, employee training, maintenance, etc. Government and War Production Board Officials will participate in these meetings.

According to W. H. Eiseman, Secretary of the Society and Managing Director of the Exposition, the more than 250 manufacturer-exhibitors are concentrating on educational displays. Many of these displays will be veritable consulting offices where industry can obtain information that will help solve the important production problems that confront us in this War of Metals.

The manufacturers and engineers who share their experience and achievments at these meetings will make a

substantial contribution toward winning this battle of production with the Axis.

Education of industry in the many new advances in welding, which already have greatly speeded war production—that will be the theme of the American Welding Society meetings.

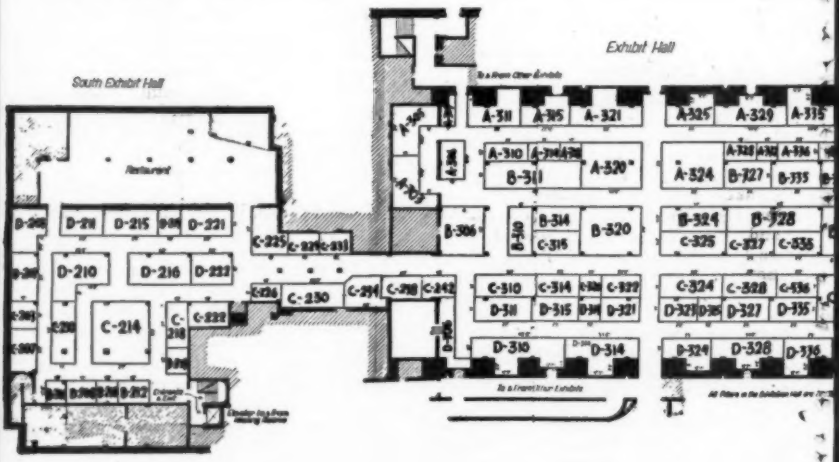
The importance of training operators to meet the demands for welded construction will be stressed. At the opening session, the entire convention will be turned over to a discussion of that subject.

Each of the more than 60 welding papers to be read, will have an important bearing on some phase of war production in which welding has figured prominently. Every day there will be papers on some phase of aircraft welding. One entire session will be devoted to welding in ship construction. Improvements in the welded construction of guns and gun mounts will be reviewed.

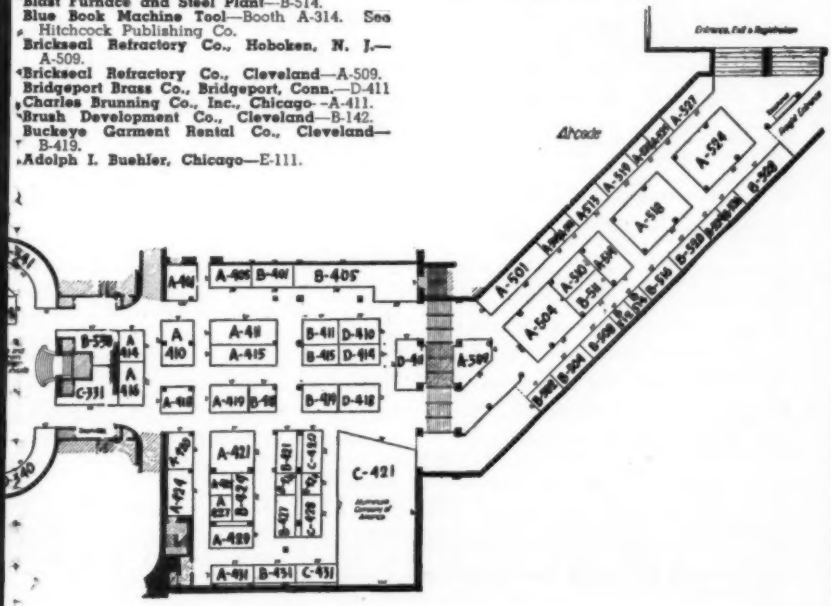
Discussions during the Metal Congress will be devoted to such important issues as "Doing More with What Alloys We Have by Using NE Steels;" "Doing More with Low Alloy and Carbon Steels"; "Speeding the Job by Better and Faster Production Hardening"; "Manufacture and Heat Treatment of Magnesium Castings"; "Segregation, Collection and Reclamation of Scrap"; "Speeding Production by Improved Metal Cutting Practice"; "Current Achievements in Powder Metallurgy"; "Training and Handling Inspectors"; Getting By with Low Tin Alloys"; "Salvage of Broken Tools and Maintenance of Equipment", etc.

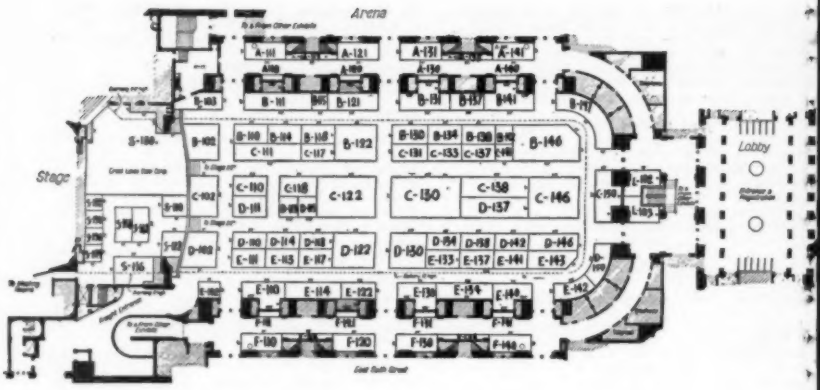
Exhibitors and Floor Plan

Acme Electric Welding Co., Huntington Park, Calif.—A-500.
Advance Polishing Wheels, Inc., Chicago.—E-113.
Agfa Ansco Div., General Aniline & Film Corp., Binghamton, N. Y.—C-238.
Alloy Castings Co., Champaign, Ill.—B-502.
Alox Corp., Niagara Falls—B-516.
Aluminum Co. of America, Pittsburgh—C-421.
Aluminum Ore Co.—C-421.
Alvey Ferguson Co., Cincinnati—S-162.
American Brake Shoe & Fdry., New York City—A-525 and B-320.
American Brass Co., Waterbury, Conn.—A-321.
American Car and Foundry Co., New York—B-314.
American Foundry Equipment Co., Mishawaka, Ind.—D-340.
American Gas Furnace Co., Elizabeth, N. J.—B-103.



American Institute of Mining and Metallurgical Engineers, Inc., New York—B-508.
American Machine and Metals, Inc.—A-418.
American Machinist, New York—E-137.
American Magnesium Corp.—C-421.
American Manganese Steel Div. of American Brake Shoe & Fdry. Co., Chicago Heights, Ill.—A-525.
American Metal Market, New York—D-319.
American Society for Metals, Cleveland.
American Welding Society, New York—A-427.
Ampco Metal, Inc., Milwaukee—B-131.
Anderson & Brown Co., Cleveland—B-137.
Anderson & Sons, Westfield, Mass.—B-421.
Andresen, Inc., Pittsburgh—B-210.
Armstrong Cork Co., Lancaster, Pa.—D-138.
Atlas Fdry. Co., Detroit—B-320.
Atlas Publishing Co., New York City—C-229.
Atlas Steels Ltd., Welland, Ont., Canada—D-113.
Automatic Temperature Control Co., Inc., Philadelphia—E-117.
Automotive and Aviation Industries, Philadelphia—C-203.
Babcock & Wilcox Co., New York—C-325.
Baker & Co., Inc., Newark, N. J.—B-415.
Banner Iron Works, St. Louis—B-320.
Barnett Fdry. & Machine Co., Irvington, N. J.—B-320.
Bastian-Blessing Co., Chicago—C-131.
Bausch & Lomb Optical Co., Rochester, N. Y.—D-150.
Behr-Manning Corp., Troy, New York—C-141.
Black Drill Co., Cleveland—D-146.
Blast Furnace and Steel Plant—B-514.
Blue Book Machine Tool—Booth A-314. See Hitchcock Publishing Co.
Brickseal Refractory Co., Hoboken, N. J.—A-509.
Brickseal Refractory Co., Cleveland—A-509.
Bridgeport Brass Co., Bridgeport, Conn.—D-411
Charles Brunning Co., Inc., Chicago—A-411.
Brush Development Co., Cleveland—B-142.
Buckeye Garment Rental Co., Cleveland—B-419.
Adolph I. Buehler, Chicago—E-111.
H. W. Butterworth & Sons, Bethayres, Pa.—B-320.
Canadian Radium & Uranium Corp., New York—S-130.
Carboloy Co., Inc., Detroit—B-324.
Carborundum Co., Niagara Falls, N. Y.—C-122.
Catskill Metal Works, Inc., Catskill, N. Y.—A-514.
Chase Brass & Copper Co., Waterbury, Conn.—B-327.
Chemical Rubber Co., Cleveland—B-520.
Chicago Flexible Shaft Co., Stewart Industrial Furnace Div., Chicago—E-114.
Chicago Steel Foundry Co., Chicago—L-102.
Chilton Publishing Co.—B-121.
City Engineering Co., Dayton, O.—D-310.
Cleveland Graphite Bronze Co., Cleveland C-322.
Cleveland Tapping Machine Co., Cleveland—A-309.
Climax Molybdenum Co., New York—A-501.
Commerce Pattern Fdry. & Machine Co., Detroit—B-424.
Continental Industrial Engineers, Inc., Chicago—C-133.
R. W. Cramer Company, Inc., Centerbrook, Conn.—C-424.
Crown Rheostat & Supply Co., Chicago—A-310.
Darwin & Milner, Inc., Cleveland—C-118.
Deepfreeze Div. of Motor Products Corp., North Chicago, Ill.—A-401.





Delaware Tool Steel Corp., Wilmington, Del.—A-325.
A. P. de Sanno & Son, Inc., Phoenixville, Pa.—B-431.
Despatch Oven Co., Minneapolis, Minn.—A-415.
Detecto Scale, Brooklyn, N. Y.—C-232.
Detroit Rex Products Co., Detroit—D-311.
Harry W. Dietert Co., Detroit—A-410.
DoAll Cleveland Co., Inc., Cleveland—B-141.
Dow Chemical Co., Midland, Mich.—B-111.
E. I. duPont de Nemours & Co., Wilmington, Del.—D-134.
Duraloy Company, Scottdale, Pa.—B-110.
Eastman Kodak Co., Rochester, N. Y.—A-318.
Eisler Engineering Co., Newark, N. J.—A-500
El Taller Mecanico Moderno—C-431.
Elastic Stop Nut Corp., Union, N. J.—A-424.
Electro Refractories & Alloys, Buffalo, N. Y.—D-315.
Electroloy Co., Inc., Bridgeport, Conn.—A-500.
Eutectic Welding Alloys Co., New York—E-140.
Experimental Tool & Die Co., Detroit—B-511.
Expert Welder Co., Detroit—A-500.
Farrel - Birmingham Co., Ansonia, Conn.—B-320.
Federal Machine & Welder Co., Warren, Ohio—A-500.
Federal Products Corp., Providence, R. I.—B-401.
Firth-Sterling Steel Co., McKeesport, Pa.—C-150.
Florence Pipe Fdry. & Machine Co., Philadelphia—B-320.
J. B. Ford Co., Wyandotte, Mich.—C-117
Fulton Foundry & Machine Co, Cleveland—B-320.
Gardner Publications, Inc., Cincinnati—C-341.
General Alloys Co., Boston—C-146.
General Electric X-Ray Corp., Chicago—E-130.
General Fdry. & Mfg. Co., Flint, Mich.—B-320.
Globar Division of Carborundum Co., Niagara Falls, N. Y.—C-122.
Globe Machine & Stamping Co., Cleveland—B-335.
Claud S. Gordon Co. of Ohio, Cleveland—E-102.
Gray Machine Co., Philadelphia—S-124.
Gray-Mills Co., Chicago—B-418.
Great Lakes Steel Corp., Ecorse, Mich.—S-150.
Greenlee Foundry Co., Chicago—B-320.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh—A-329.
H & H Research Co., Detroit—C-242.
Hamilton Fdry. & Machine Co., Hamilton, Ohio—B-320.
Hamilton Tool Co., Hamilton, O.—D-310.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.—D-122.
Handy & Harman, New York—D-314.
Heat Treating and Forging, Pittsburgh—B-514.
Heil & Co., Cleveland—A-332.
Hevi Duty Electric Co., Milwaukee—D-142.
Hild Floor Machine Co., Chicago—C-324.
Hitchcock Publishing Co., Chicago—A-314.
The Machine Tool Blue Book, Hitchcock's Machinery Review,, Industrial Export Catalogs and Wood Working Digest.
In attendance: R. C. Van Kampen, president; Wesley G. Paulson, editor; R. J. Ferncase, Midwest representative; D. B. Trott, Ohio representative; and M. H. Kauer, Editorial Dept.
A. F. Holden Co., New Haven, Conn.—B-147.
W. J. Holliday & Co., Hammond, Ind.—C-315.
E. F. Houghton & Co., Philadelphia—D-137.
Illinois Testing Laboratories, Inc., Chicago—E-133.
Independent Pneumatic Tool Co., Chicago—C-314.
Industrial Export Catalogs—A-314—See Hitchcock Publishing Co.
Industrial Heating—D-325.
Industrial Press—S-122.
Industrial Publishing Co.—A-416.
Industry and Welding, Cleveland—A-416.
Instrument Specialties Co., Inc., Little Falls, N. J.—C-335.
International Nickel Company, Inc., New York—C-111.
The Iron Age, New York—B-121.

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Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1 Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.

2 Saves time and expense of drawing or tempering small metal parts in large furnaces.

3 Cuts handling time when normalizing or annealing small parts. No waiting.

4 Conveniently available for pre-heating for subsequent high-speed hardening.

5 Eliminates shut downs and delays in servicing emergency repair orders.

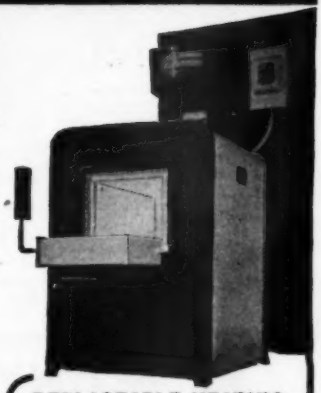
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$142.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

FREE Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.

COOLEY ELECTRIC MANUFACTURING CORP.
213 S. SENATE AVENUE • INDIANAPOLIS, IND.

C. Walker Jones Co., Philadelphia—B-524.
Kanawha Mfg. Co., Charleston, West Va.—B-320.
J. W. Kelley Co., Cleveland—C-336.
Kelley-Koett Mfg. Co., Covington, Ky.—E-114.
Andrew King, Narberth, Pa.—B-118.
Kinney Iron Work, Los Angeles, Calif.—B-320.
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Machine Tool Blue Book—A-314. See Hitchcock Publishing Co.
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Mahr Mfg. Co., Minneapolis, Minn.—D-418.
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Manhattan Rubber Mfg. Co., Passaic, N. J.—D-323.
Marquette Mfg. Co., Minneapolis, Minn.—A-315.
Martindale Electric Co., Cleveland—B-114.
Matchless Metal Polish Co., Chicago—E-113.
Mazlo Magnesium—C-421.
McKenna Metals Co., Latrobe, Pa.—C-110.
Meehanite Res. Inst. of America, Pittsburgh—B-320.
Metal Finishing—B-526.
Metal Industry Publishing Co., New York—B-526.
Metal Progress. See American Society for Metals.
Metals & Alloys, New York—A-513.
Mill & Factory, Chicago—L-103.
Minnesota Mining & Mfg. Co., St. Paul, Minn.—B-340.
Modern Machine Shop, Cincinnati—C-431.
Molybdenum Corp. of America, Pittsburgh—D-111.
Monarch Steel Co.—C-315.
Morrison Engineering Co., Cleveland—A-414.
Morse Magneto Clock Co., New York—A-511.
Motor Products Co.—A-401.
Multi-Hydromatic Welding & Mfg. Co., Detroit—A-500.
National Electric Welding Machine Co., Bay City, Mich.—A-500.
National Industrial Publishing Co., Pittsburgh—D-325.
National Machine Works, Chicago—B-130.
National Machinery Co., Tiffin, O.—A-335.
National Refining Co., Cleveland—A-420.
Niagara Blower Co., New York—C-428.
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Norton Co., Worcester, Mass.—C-138.
Oakite Products, Inc., New York—E-134.
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You can save precious time with No. 15's Quick Set-Up and Hand Feed Control. No dogs or feeds to adjust or change. Covel Bulletin MT-102 tells how Covel No. 15 (6x18) Hand Feed Surface Grinder saves minutes per day—precious hours per week!

Ball Bearing Quill for Hand Feed.

Spiral gear on end with rack under table for smooth, easy operation. Completely dust-protected.

Write, wire or phone for your copy and name of nearest dealer TODAY.

Grinding Machinery Since 1874

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Reeves Pulley Co., Columbus, Ind.—A-419.
Reinhold Publishing Corp.—A-513.
Resistance Welders Mfrs. Assoc., Warren, O.—A-500.
Revere Copper & Brass Co., New York—B-306.
Riehle Testing Machine Div., American Machine and Metals, Inc., East Moline, Ill.—A-418.
Rolock, Inc., Fairfield, Conn.—S-132.
Rosedale Fdry. & Machine Co., Pittsburgh—B-320.
Ross-Meehan Foundries, Chattanooga, Tenn.—B-320.
Rustless Iron & Steel Corp., Baltimore, Md.—C-102.
Safety Socket Screw Corp., Chicago—C-226.
George Scherr Co., New York—E-110.
A. Schrader's Son, Brooklyn, N. Y.—D-410.
Sciaky Bros., Chicago—A-518.
Selas Co., Philadelphia—D-102.
Sentry Co., Foxboro, Mass.—B-411.
S-M-S Corporation, Detroit—A-500.
Sparkler Mfg. Co., Mundelein, Ill.—A-523.
Spencer Turbine Co., Hartford, Conn.—E-141.
Sperry Products, Inc., Hoboken, N. J.—A-306.
Standard Oil Co., (Ohio), Cleveland—D-36.
Standard X-Ray Machine Co., Chicago—A-429.
Stearns-Rogers Mfg. Co., Denver, Colo.—B-320
Steel—E-143.
Steel Publications—B-514.
Sterling Alloys, Inc., Woburn, Mass.—B-115.
D. A. Stuart Oil Co., Ltd., Chicago—C-310.
Surface Combustion, Toledo
Swift Electric Welder Co., Detroit—A-500.
C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.—S-126.
Taylor-Hall Welding Corp., Worcester, Mass.—A-500.
Taylor-Winfield Corp., Warren, O.—A-500.
Tel Autograph Corp., New York—C-233.
Tempil Corp., New York—B-138.
Tennant Co., G. H., Minneapolis, Minn.—S-110
Thompson-Gibb Electric Welding Co., Lynn, Mass.—A-500.
Tide Water Associated Oil Co., New York—D-324.
Tinnerman Products, Inc., Cleveland—D-414.
Titanium Alloy Manufacturing Co., Niagara Falls—A-336.
Harold E. Trent Co., Philadelphia—A-405.
Triplex Machine Tool Corp., New York—D-310.
Ultra Lap Machine Co., Detroit—D-310.
Upton Electric Furnace Div. — B-424. See Commerce Pattern Fdry. & Machine.
Valley Iron Works, St. Paul, Minn.—B-320.
Vanadium Corporation of America, New York—A-510.
Vascoloy-Ramet Corp., North Chicago, Ill.—A-504.
Victor Saw Works, Inc., Middletown, N. Y.—A-328.
Vulcan Fdry. Co., Oakland, Calif.—B-320.
Wall-Colmonoy Corp., Detroit—B-339.
Warren Fdry. & Pipe Corp., Phillipsburg, N. J.—B-320.
Welding Engineer Publishing Co.—S-158.
Welding Engineering Co., Milwaukee, Wis.—
Welding Machines Mfg. Co., Detroit—A-500.
Welding Sales & Engineering Co., Detroit—A-500.
S. K. Wellman Co., Cleveland—E-142.
Wells Manufacturing Corp., Three Rivers, Mich.—B-310.
Westinghouse Electric & Mfg. Co., E. Pittsburgh—B-405.
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Wire Association, Stamford, Conn.—A-425.
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Gray-Mills *Portable* COOLANT SYSTEMS

. . . Give the Advantages of *Coolants* to ALL your Machine Tools!

Save TIME and TOOLS INCREASE PRODUCTION

Filing Engineering Data

By W. C. DEGRAFF, Warner & Swasey Co., Engineering Dept., As told to Jerome Harris

WE have had 4 years to observe the value of our Technical Data File. Its chief benefit falls into two categories:

(1) We have instant access to all available drawings, estimates, and original thought devised by our Engineering Department on previous jobs.

(2) Duplication of expensive and time-consuming drawings and research is eliminated while, by the same token, completely new problems are more quickly handled.

An Organizational Problem

Since we had always, in the past, maintained a file of drawings and estimates, our problem in building our new system was chiefly one of organization. We needed an index that would lead infallibly to desired data. And we needed a simple, foolproof system for maintaining our technical file as new drawings and materials were added.

It is now possible to say that this plan has proved, in our case, to be completely practical—that it has saved us many hours of engineering effort

The complete Technical Data File, with cross-indexes, affords a convenient, compact working and service counter.

Close-up of the Order File containing all previous orders, indexed numerically.

at a moment when the nation's time-premium is at its highest.

The Technical Data File has 6 main divisions:

(1) **Order File:** copies of all previous orders, tool lists, and complete specifications covering all special and standard tools manufactured on each order, are filed in folders.

(2) **Order File Index:** a cross index by company name to previous orders.

(3) **Estimate File:** copies of all estimates submitted, together with specifications and sketches.

(4) **Catalog File:** copies of all catalogs, specification sheets, and other data supplied by the vendor on material procured from the outside for use in manufacturing tools to be used on the turret lathe.

(5) **Subject File:** miscellaneous ideas and material classified by master subject and broken down to component sub-subjects. (A section of the list of classifications, at the end of this article, shows our headings for this file)

(6) **Subject Cross Index:** a listing by classification of all data pertaining to tools previously ordered or estimated. Cross index to all data is provided.

Thus, in these 6 files, we have not only centralized all pertinent engineering facts, but we have the means for **finding** the materials we have filed. It is well to note at this point that the heart of the system is the Subject Cross Index. And its success, of course, must depend on how accuractely our classification of subject headings was conceived when the system was organized. Our list was compiled only after considerable research and study, and has proven itself effective in practice. The reader may find it wholly inadequate for his problem—but **whatever his business**, be it tool-maker or research laboratory, the **overall** aspect of his system would follow much the same general set-up as ours.

How the System Works

Suppose, then, that we are about to make an estimate on a new tool for the XYZ Automobile Co. We would

CIRCULAR, STRAIGHT AND *irregular* SURFACES can be generated

The GEAR SHAPER offers a cost-saving method for the precision-finishing of straight, circular, and irregular surfaces on all sorts of parts—as for example, the semi-circular surface on connecting rod ends. Fellows Cutters can also operate internally as well as externally, and cut up to shoulders, or into recesses... For a more comprehensive picture of Gear Shaper possibilities, write for a free copy of our book, "The Practical Art of Generating."

THE FELLOWS GEAR SHAPER COMPANY

78 River St. Springfield Vermont—640 West Town Office Building Chicago Illinois—416 Fisher Building Detroit Mich.

first consult our Order File Index for previous tools manufactured for XYZ. The index to the Order File is housed in a Kardex Visible System. For each order for special equipment we have received in the past from XYZ, a clerk has prepared a separate Kardex form. These forms are installed in Kardex equipment according to straight alphabetical indexing. When more than one order is received from a single firm, successive forms for each order are filed numerically after the original card. Thus, all orders from a single firm can be located at a single spot in the index.

On each Order File Index form for the XYZ Co., there are entered full details of each tool covered by the order. This includes the quantity, the name and number of the tool, the

(Right) Closeup of the Chaindex Cards in the Subject Cross Index. (Below- The Order Cross-Index housed in Kardex Visible Equipment.

drawing number, the purpose for which the part is to be used, and the part number which is to be made with the tool.

From these Order File forms, then, we can get this data at a glance:

(1) A summary of all tools manufactured for each customer.
(2) A cross reference to drawings, which are filed elsewhere by number.
(3) Information as to whether or not there is pertinent information we can use in the Order, Estimate, Subject or Drawing Files.

Having determined that there is an old order that might apply, we consult the Order File itself. This is set up in standard letter size filing cabinets with a separate filing folder for every order. It is indexed by company name and then by order number. In it we have a copy of the actual order with tool lists, costs, etc.

Like hundreds of other plant items, even the best chucks—or anything else for that matter—wear out *some* time.

If new stocks are scarce and your want is immediate, you "need a friend" in a big hurry. *Here he is,* all set to give you the help you need—just call the Representative of your nearby Industrial Supply Distributor. For, even if *he* hasn't any in stock, he is almost sure to know many possible sources that may be closed to you. So when he says "don't worry—we'll scout up an emergency supply for you if there's any in town," you can be sure he will make every effort to keep you going. And usually he will *succeed.*

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency.

It's good business to take your own Distributors into your confidence and use them all the time. We know, because for many years they have been *our* Sales Representatives on Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.

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"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

HOW THE FILES ARE HOUSED

Order File: in vertical filing cabinets. Indexed numerically by order number

Estimate File: in vertical filing cabinets. Indexed numerically by estimate number.

Catalog File: in vertical filing cabinets. Indexed by name of vendor, alphabetically.

Subject File: in vertical filing cabinets. Indexed alphabetically by classification.

Subject Cross Index: in Chaindex installed in Kardex Cabinets. Indexed alphabetically by subject classification.

Order Cross Index: in Visible Kardex Cabinets, 8" x 5" forms. Indexed alphabetically by Customer's name and order number.

List giving location and functions of the different files and indexes.

At the same time, having discovered from the Kardex form the drawing numbers of pertinent tools, we have these pulled from the Drawing File. This file is indexed numerically, and can be consulted by obtaining the number of the drawing needed from the Kardex Order File Index. The Subject File is also investigated.

If we desire, at the same time, we consult the Catalog File which is indexed alphabetically according to the vendor's name. Thus, all accumulated information for XYZ has been brought to light in a matter of minutes by the Kardex Order File Index.

When A New Customer Is Handled

Let us suppose, for the moment, that an order is received from a company with whom we have had no previous contact. Of course, we have no accumulated data for that company. But somewhere in our files, it may be hoped, we do have drawings and data that will bear upon the problem in our new customer's order.

It is at this point that our general Subject Cross Index assumes major importance. As already stated, the Subject Cross Index has been broken down according to a pre-determined overall listing of parts and tools. For each subject heading, a Chaindex Visible card was created when our system was installed. (See Exhibit A)

These Chaindex cards intermember ingeniously, one under the other, much as in a chain. They are housed in standard Kardex pockets and installed

EXHIBIT "A"

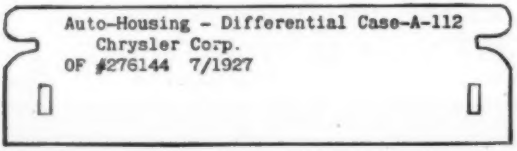
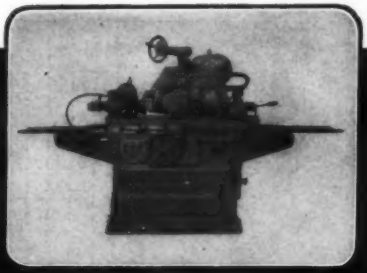


Exhibit "A" showing a sample Chaindex visible card.



New

FITCHBURG

ADJUSTABLE "TYPE C"

Angular Head

GRINDER

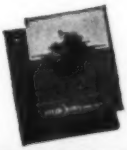
FOR PLAIN CYLINDRICAL GRINDING

. . . FROM *0 degrees to 45 degrees*

The Fitchburg Adjustable "Type C" Angular Head Grinding Machine is another single application of the Fitchburg Standard Bowgage Wheelhead Unit. The "Type C" is designed to handle a wide range, and a number of types of jobs. In finding ways to cut your grinding time and costs it will pay to consider what this machine can do.

This newest of Fitchburg plain cylindrical grinders has a Standard Wheelhead Unit mounted so that it may be located to grind from 0 degrees up to a 45-degree angle. Previously angular head grinding machines have been equipped with fixed heads for single purpose grinding. The Bowgage head on the Fitchburg "Type C" is adjustable and can be swivelled to various positions for standard plain grinding, thus providing greater grinding utility. The head goes through a completely automatic cycle — rapid traverse to work, correct feed, grinding dwell and rapid return. The workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds. The trueing device is hand operated and mounted on the work table.

The Fitchburg "Type C" grinder is designed to meet war time production speed and maintain highest efficiency. Ease of operation is assured by centralized controls. In every detail it meets all the requirements of plain cylindrical and taper grinding — in large or small lots of work, with assured accuracy and fine finish, at low cost.



Send for new fully illustrated folder — write for it on your business letter-head — it will be mailed free.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders

Order No. _____

SPECIAL TOOL LIST

Customer's Name: _____ Checking Oper. _____

For Machining _____

NOTE	ANT.	DESCRIPTION OF TOOLS	TOOL	TRACING NO.	REMARKS

All material other than stock - Ordered by _____
Listed by _____
Checked by _____

DATE _____

MC-649-15

Here are reduced copies of two of the standard mimeographed forms. Exhibit "B" (above) is the Special Tool List on which the Engineering Dept., enters a list of the tools required on a new order. Exhibit "C" at the right is an indexing form for subject classification and cross-indexing.

Exhibit "C"

SALES ENGINEERING DEPARTMENT

DATE.....,..... ORDER NO..... ESTIMATE NO.....

NAME OF COMPANY.....

CITY..... STATE.....

SUBJECT OR METHOD .....

.....

CROSS REFERENCE

1 - .....

2 - .....

3 - .....

4 - .....

FILLED IN BY .....

Approval on subject, method and cross reference to fall under master subject classification.

BY.....DATE.....

FILE WITH MATERIAL IN E.F. OR O.F. FOLDER.

TYPIST INSTRUCTIONS -

Type order card from special tool list down to .....

Other instructions .....

.....

.....

.....

FILE CLERK INSTRUCTIONS -

File the following material in subject file and check cross references .....

.....

.....

.....

File material in catalog file .....

.....

MC-649-14

GOVERNOR CONTROL ASSURES UNIFORM GRINDING

↑ **FAST, EFFICIENT GRINDER** for general use, CP 314 is ideal for light to medium-heavy wire cleaning. Ten models, wide range of speeds, variety of equipment.

VIBRATIONLESS SPEED UNDER LOAD LENGTHENS WHEEL LIFE

A Grinder for Every Job

NEW YORK (CP)—Essential to fast uniform grinding is vibrationless speed under load. In the large line of Chicago Pneumatic Grinders this feature is assured by stability and rigidity of design, which, coupled with governor control, not only results in the removal of maximum metal but also minimizes wheel damage and uneven wheel wear.

There's a CP Grinder for every job. Write for your copy of the latest CP Catalog of Pneumatic Tools and Accessories—it describes the complete grinder line.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York, N. Y.

↑ **STURDY CONSTRUCTION** of all CP Grinders assures long, heavy-duty service and minimum maintenance.

CP PNEUMATIC GRINDERS

described in latest Pneumatic Catalog:

GENERAL PURPOSE
MEDIUM TO HEAVY-DUTY
ROD, DIE AND ANGLE
POLISHERS
SANDERS

Send for a Catalog

↑ **LIGHT WEIGHT, TRUE BALANCE** of all CP Pneumatic Grinders make handling and control easy for the operator and increase production.

CHICAGO PNEUMATIC

PNEUMATIC TOOLS

ALSO: Air Compressors, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

WRENCHES
DRILLS
REAMERS
RIVETERS
CHIPPERS
GRINDERS

in Kardex cabinets. So compact is this intermembering that we have been able to install over 1,000 cards in a single cabinet!

The Chaindex cards are indexed alphabetically by major subject classification and sub-subject. On the card are also given the machine on which the tool is to be used, the name of the customer for whom it was made, and the order number and date of order. A prefix coding of OF or EF is also assigned. OF refers to the order file—EF to the Estimate File.

It is a simple matter, with this cross index, to determine whether there are drawings or data within our file that will help us to handle the new customer's order. And due to the extreme compactness of the Chaindex set-up, this information can be determined at a single glance!

It is well to note that this Subject Cross Index is also of value when handling an order for an old customer. If, the XYZ Co., for example, were to order a new type tool never ordered by them before, we would consult the

SUBJECT: CLASSIFICATION

Account Numbers
Adapters
Agitators - See Washing Machine Parts-Agitators
Air Conditioning
    Valve Body
Air Bottles
Air Equipment
Air Motors & Tools
Airplanes
    Bearings & Bushings
    Connecting Rods
    Counterweight
    Crankcases
    Crankshafts
    Diffuser
    Engine Cylinders
    Fittings
    Housing
    Hubs
        Adjustable pitch
        2 Blade
        3 Blade
        Blade Sockets
    Landing Gear
    Motors
    Parts General
    Propellers & Hubs
    Valves
    Wheels
Andirons - See Brass Goods
Annealing - See Heat Treating
Assembly Plate - See Electric Motors
Automatic Chucks - See Turret Lathes
Automobiles
    Bearings & Bushings
    Brake Drums
    Carburetor Parts
    Connecting Rods
    Counterweights
    Crankcases
    Cylinders
    Differential
    Diffusers
    Distributors
    Fluid Drive

subject index for material prepared for other companies on a similar problem.

How the File Is Kept Up-To-Date

Having established a going system for **reference** to our Technical Data File, our final job was to develop a plan that would permit us to enter **new** data as it was received.

Two standard mimeographed forms were prepared. On the first (See exhibit B), known as the Special Tool List, the Engineering Department enters a complete list of all tools concerned with a new order. Using this Special Tool List, an Indexing Form (Exhibit C) is filled in and passed to someone in authority for approval as to subject classification and cross reference details. The **approved** Indexing Form is then turned over to a stenographer who prepares the Kardex Customer order form, the Chaindex Reference cards for filing in the Subject Cross Index, and a gummed label for the folder in which the order data is to be filed.

The important step in this process, of course, is the **approval of subject classification.** Where there is any possible overlapping as to Subject heading, two index cards are created—one for each heading. In this manner there is no danger of material becoming "hidden" within the Order, the Estimate, or the Drawing Files.

There can be no doubt but that our Technical Data File has been highly productive in saving our Engineering Department time and money. As an aid to improving both product and customer service, particularly in the stress of the War effort, it has become an indispensable agent.

"Keep 'em Flying"
Buy U. S. War Savings Bonds and Stamps

subject index for material prepared for other companies on a similar problem.

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Final inspection of Anker-Holth air cylinders.

An Anker-Holth shipment made the day the order was entered.

So writes a production official of one of America's foremost electrical manufacturers. His problem was economical and immediate mass production of parts for large war contracts. Anker-Holth filled his needs by *prompt shipment* of high speed revolving air cylinders.

Wire, or phone, your air cylinder and air operated chucking device requirements to Anker-Holth. You will find deliveries exceptionally prompt.

Anker-Holth Mfg. Co.

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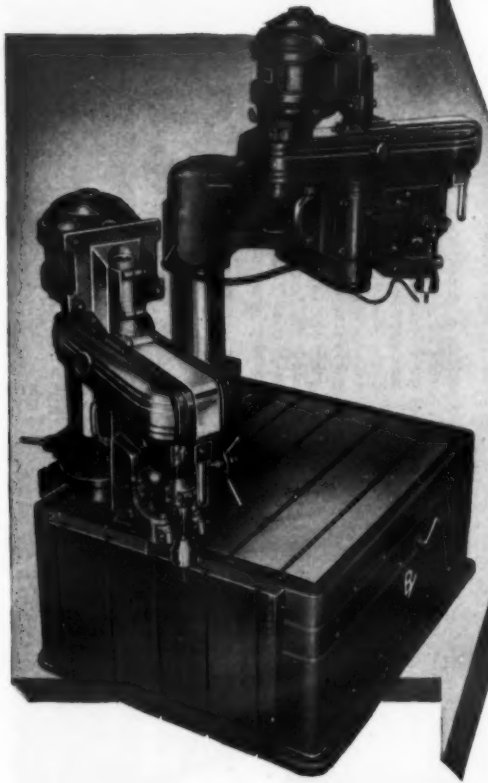

When Women Work

By DR. J. H. HAZLEHURST,
Panel Consultant, War Production Board
As told to MARIE G. HEUER

A PERSONNEL manager told me a few weeks ago that he was putting a number of women to work, and had to argue the point with several executives and practically all of the foremen before he could add their names to the payroll. This is typical of many of the small plants supporting the bulk of the working population, in spite of the fact that the need for women in the war effort is beyond dispute.

I'm not so much concerned with the jobs women can do or how many women are being pushed into jobs. I'm more concerned with the things personnel people must consider to get effective service from women in industry, as well as in some of the larger factories. But shop executives and foremen in smaller plants are afraid of them and can see a million problems that might come up.

Of course, problems do come up. And management must be aware of them to develop the kind of relations with women workers that will make for harmony and maximum production.

So far as measurable characteristics are concerned, all the studies made indicate that there is little difference between men and women with regard to brains or abilities. The differences we see are cultural, the result of our economic and social set-up. But those cultural differences have a definite effect on the way women must be treated.

Perhaps the chief characteristic is the one that everyone recognizes — that women usually take jobs temporarily. This is not true of career women in

Candid angle shot of milling machine operation (Westinghouse photo).

professional work, but back of the average woman's mind, consciously or unconsciously, is the notion that her job is going to be temporary—until she gets married, until her husband gets a better job, or some other similar reason. One result of this attitude is that women in industry have from 2 to 3 times higher absence rates than men, and firms utilizing women workers must plan for this when making their general schedules. Whether a woman lives in her own home or with her parents, she characteristically thinks more in terms of home than men do. If a member of the family is ill, or any other difficulty comes up at home, a woman will stay away from her job until it is settled. Women will take time off to do Christmas shopping and to do a lot of things that men would not do during working hours. And married women are likely to have higher absence rates than single women.

I might mention that if you talk with executives and they get down to cases on women in the plant, they will, very likely, bring out the point that a woman may not take a day or two off each month, but that there is generally about a week when their capacity is impaired. A number of studies have been made on whether there is physical and psychological impairment during such times. Every study shows there is no impairment of visual acuity, steadiness, or any of the other abilities required on precision jobs. It is true, however, that many women are incapacitated for a half day, or are extremely uncomfortable, and it is important to have rest room facilities, a medical shelf, and if possible a nurse or doctor available as a routine part of the health program.

The average woman's attitude that her job is only temporary has an effect that may be a definite advantage in the war emergency. She tends to be happy at a job different from the work she had in mind, or is accustomed to doing. If men are in jobs not leading to their long term goals, they're dissatisfied. But women don't mind working on jobs they had not thought of before, especially when the wages are good. When you suddenly have a war contract and need workers in a hurry, women may not be so fussy as men in selecting jobs. They will give their full attention to jobs, even tho they are not fundamentally interested in them.

Women rate high at jobs requiring manual dexterity and patience. This is Miss Harriet Zimmerman, grinding machine operator in one of the American Car & Foundry tank building plants.

Women are more interested in people, and are more influenced by them than are men. If a man likes his boss, that doesn't mean that he likes his job. But if a woman likes her boss, she likes her job. She's influenced by the people she works with too, and will "walk out" on the job if her relationship with fellow workers is not pleasant. Try to get homogeneous groups. Don't run Polish girls and Italian girls together,

if you can help it. Instead, put a gang of Italian girls on one job and Polish girls on another job. If possible, watch groups according to educational background. If you put a couple of college girls with a bunch of non-college girls, for instance, you run the risk of having cliques—and hard feelings. This is important in handling men too, but women are even more touchy when put in a situation where they feel inferior.

Women want to be judged on the merits of their work. They dislike patronage. This is Miss Edith Whitmire, adjusting parts in jigs for grinding at American Car & Foundry tank plant.

Another thing. Women like admiration but they prefer to be respected for what they can do. Often a shop foreman acts surprised when a woman does anything well, and nothing in the world aggravates a woman so.

"Look," he'll say, "she does that job all right—and she's a woman too."

It's the same attitude a man would have toward a youngster of 5 who happens to do something cute. It smacks of paternalism and condescension. Women dislike it as much as they dislike the familiar attitude some men take with women workers. A woman worker wants an understanding attitude, and she'd rather be told she's incompetent if she is, and to have her competence recognized for what it is worth to the company.

In setting up supervisors, it's important to pick men who have the right attitude to begin with, or to train them in the right attitude from the beginning . On the whole, women work better for men bosses who respect their ability, than they will for women.

Often they learn better from women. There's some connection between this and the fact that women become discouraged more quickly than men do. If you can, train your women in groups and use women trainers. A good sound training program will pay dividends. Not the kind of job training done in some companies, where the new worker simply watches an experienced one and picks up what she can on her own. For women workers, that's fatal. Many women get so disheartened under such treatment that they will not report for work the next day. Perhaps they won't even come back after lunch. It's amazing how fast they disappear, under treatment that makes them feel inferior.

Of course, it may be necessary to use your foremen for training. That's possible too, if done carefully, as indicated in one plant manager's comment:

"At first our foremen were afraid to train women. When they had J. I. T. training, however, they became a lot more confident about it. Here is a training method that applies to anyone and that gets results with women as well as men.

"J.I.T." or Job in Industry Training is a 4-step plan worked out by the War Production Board, which can be

Women in shops prefer sensible clothes —but they like some choice even there. Miss Frances Lucchese, who inspects small precision parts in one of American Car & Foundry Co's. tank building plants borrowed the white coat for the occasion.

applied effectively to any job on the production line, to a new man or woman worker.

It incorporates the best that is known about training and insures the new worker's understanding of exactly what he is supposed to do—and why careful, exact work is vitally important. The friendly approach used in the "J.I.T." plan, wins loyalty and cooperation as well as performance. The plan is available to any plant working on war contracts, free of charge. Just let the War Training Department of your area know you are interested. They will answer any questions you may have, and arrange for your foremen to get the necessary instructions as soon as possible.

Studies show that the general run of women are not so good at mechanical work. Women engineers are scarce, not only because women are not trained that way, but because they are not inclined that way. Salesmen know that the way to sell an electrical appliance to a woman is to tell her;—"You don't have to do anything but push a button." However, some women do have excellent mechanical ability, and it is wise to use aptitude tests to discover which ones do.

Monotonous, routine tasks, however—at these the average woman is much better adapted than are men. At manual tasks she has more manipulative skill and shows up significantly better on tests. If you can, de-skill your jobs. Here, for instance, is a lathe on which surfacing must be done. A man could be given the job of setting up the lathe. Then teach a woman how to take off one cut or two cuts, and train another woman to take the next operation. Trainers who have tried to make all-around machinists of women have not had much luck. On one operation, however, a woman can learn to do as well as the average man. Production generally is likely to be better. This is an extremely important point to remember in setting up jobs for women.

Another very significant difference between men and women—women are much more concerned about cleanliness and tidiness. Men are not too concerned if the floors in washrooms are dirty. For women you must have clean washrooms and restrooms, plenty of mirrors, and clean, fresh workrooms. The controller for a chain of department stores tells a story that illustrates this point. The store management wanted to put in some escalators several years ago, to increase store traffic and business. One of the men in the firm suggested that he felt the money would be better spent on some fancy powder rooms. The management decided to experiment with both ideas. In one store they put in the escalators. In another they built the lovely powder rooms—and found that traffic in that store increased to a significantly greater degree than in the store with the escalator.

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Who ever heard of a man going to one store rather than another because it had nicer washrooms? But any department store manager will tell you that facilities of this kind are important. Women have actually gone from one factory to another because of more attractive rest room facilities. Whether they are required by law or not, it is good business to have attractive rest rooms and wash rooms and to have rest periods set up so that the women workers can use these facilities to a greater extent than men would under the circumstances. Studies show, too, that production may increase 12-15 per cent with regular rest periods, on all jobs requiring continuous sitting or standing. Rest periods are particularly effective if they can be spent in a quiet environment, with plenty of fresh air, and with an opportunity for light refreshment.

Can women handle as heavy jobs as men? Experience shows that women are weaker physically than men, both per pound and per individual. Take a 150 pound man and a 150 pound woman, and the man almost invariably will be able to lift more. In England, women were tried on jobs requiring continuous lifting and carrying. They did those jobs, but found that the strain and physical impairment were great. Since then English industrial firms have developed special jigs and gadgets to assist women workers in handling heavy pieces.

The matter of uniforms for women is recognized pretty generally by this time. Women can't run around machines with skirts and sleeves and frills. They must have their hair protected so it will not get into machinery. In some plants, the girls have voluntarily adopted a uniform type of slack suit in red, white, and blue — blue slacks, red suspenders, and white blouses. On the whole, however, it has been found have that it is better to have two or three uniforms from which to choose. Letting women have their choice of uniforms helps them to get away from the feeling of being regimented, gives them the feeling of expressing their individuality. Men don't mind dressing exactly like some one else—but women do. If you employ many women, it would cost no more to have a choice—and it would mean a great deal in stepping-up morale.

One last point—women do have a good influence in the shop. A number of personnel men who have worked with them have found that it is wholesome for men and women to work at the same kind of operations together. Conversation in the shop is more wholesome. Production steps up.

Women do contribute something worthwhile to industry in the war situation. Treated fairly and with understanding they can play an important part in keeping up the production levels required to make the war effort count.

As a rule, women can be trained more easily by women—but they generally do better work with men bosses. (American Car & Foundry photo).

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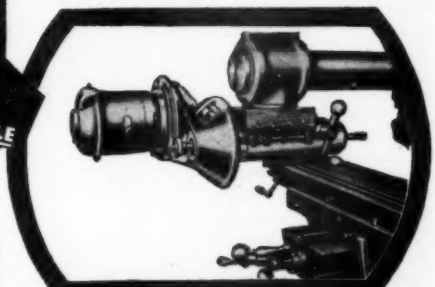

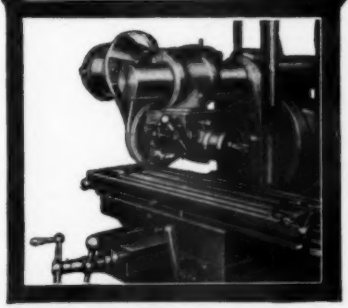

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Carbide Dies for Tube Drawing

By EARL GLEN*

WITH the necessity for increased rate and quantity of output in the production of tubing, a widespread increase in the use of carbide dies and mandrels for tube drawing has been evidenced recently. Such dies and mandrels are being used today for drawing tubing as small as 0.013" (for hypodermic needles) and as large as 3½". Even larger sizes of tubing are now possible with the provision at Carboloy of equipment for manufacture of large diameter dies and mandrels.

Primary advantages of carbide mandrels and dies compared with steel or chrome varieties are:—(1) Longer die and mandrel life. (2) Higher drawing speeds. (3) Lower cost over life of die.

Carbide die life, when drawing steel tubing, is measurable in millions of feet as against thousands of feet for chrome plated or straight steel dies. While life of the carbide mandrels naturally is somewhat shorter than that of carbide dies, their life compared with other materials is even more striking than in the case of carbide dies. Experience to date has shown an average carbide mandrel as having a life in excess of 200,000 ft., while some have run well in excess of half a million feet of tubing. This compares with around 10,000 to 20,000 feet for steel or chrome plated mandrels.

When steel dies are used, die wear increases rapidly with increased drawing speeds. With carbide dies, however, experience has shown that higher drawing speeds are possible even with much of the older equipment. Usually tube drawing speeds run around 25 to 50 per cent or more in excess of those for the same job when using steel dies.

As to cost, it is generally estimated that a Carboloy die pays for itself at around 200,000 feet of steel or brass tubing. This seems to hold true for most sizes. As a matter of fact, however, some carbide dies — especially when re-sized to draw progressively larger tubing than on the original run —now show production records well above 8,000,000 feet of steel tubing. On aluminum tubing, die life is even greater and the differential between carbides and steel even more pronounced.

On copper and stainless steel tubing, while total die life is shorter, the differential is also greater and the dies pay for themselves at considerably less than 200,000 ft. Stainless, as a matter of fact is almost universally drawn with carbide dies today, for this reason.

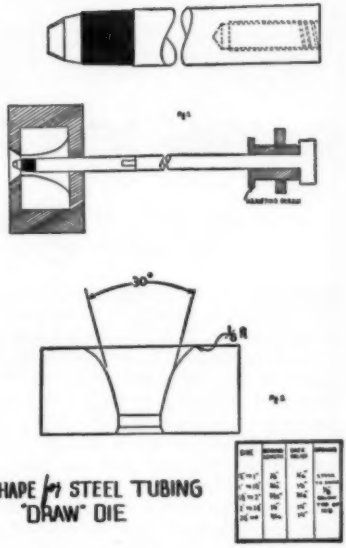
Some forms of copper tubing, particularly the nickel coppers in one to 2½" sizes as used for condensers, are also being drawn almost universally thru carbide dies today. Steel dies and mandrels apparently will not stand up

*Engineer Carboloy Co., Inc., Detroit.

when drawing this extremely tough material.

For the drawing of common steel tubing, both carbide dies and carbide mandrels are being used increasingly today due—in addition to the higher drawing speeds and lower cost previously mentioned—to the advantages of longer runs before die change, decreased set-up time, better finish obtained and reduced die pick-up.

The better finish obtained, incidentally, is not an inherent characteristic of the carbide material itself. Just as a good finish can be obtained with steel dies when the production run is first started. The difference is that the finish soon deteriorates with steel dies while it is maintained over a long run with carbides.



Mandrels

Shown in Fig. 1 is a highly effective design of Carboloy mandrel for tube drawing. The carbide portion, shown in black, is usually tapered approximately 0.010" over the nib length. The purpose of this is to simplify reconditioning. When new, the tubing will hit the nib near the diameter over the entire nib length slightly. When reapplied, the tubing then hits the nib slightly farther back. The same process can be repeated until the maximum nib diameter (at the large end) is reduced below the minimum size.

While this design is apparently most effective in insuring long mandrel life, it does depend for its efficacy to some extent on the accuracy of mandrel adjustment available in the equipment. Usually, lengthwise adjustment of mandrels is either by screw or hydraulic mechanisms. Where proper adjusting means are not available, some companies use straight nib carbide mandrels.

These Carboloy mandrels are available in standard sizes running from 0.424 to 2.250", measured at the heel diameter of the nib, with larger or smaller sizes available on special order.

Die Design

Carboloy tube drawing dies are designed to be used interchangeably with steel dies. There is considerable difference between die designs used to produce tubing by sinking and by drawing respectively, as shown in Figs. 2 and 3. Sinking dies are characterized by small approach angles and long bearings, whereas draw dies for steel tubing have a larger approach and a shorter bearing length. Draw dies cannot be used for sinking since the work would come out of the die undersize.

The reason for the long bearing in sinking dies is to help keep the tube round and straight. When the die wears, and tubing starts to come out oversize, it is necessary only to relap the die, sharpening the angles while

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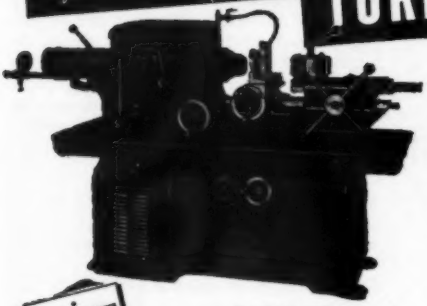

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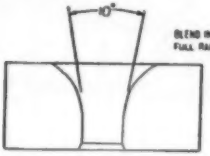
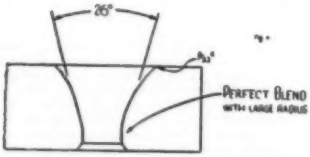
maintaining the same bearing length. The tubing then will come out to correct size again.

The use of large angles in carbide tubing-draw dies is based on the general practice of taking relatively large reductions per pass. With carbide dies, the usual practice is to reduce diameter approximately ⅛ to ¼" per pass, altho there are successful installations where, say, 2⅛" tubing is produced in one pass from 3" stock. In draw dies, bearing length is not particularly important since most of the "wear" on the die falls in the approach angle section at the point where the diameter of the opening corresponds to the diameter of the stock being drawn.



STEEL TUBING
"SINK"



COPPER TUBE
"DRAW" & "SINK"

There is considerable difference in design also between carbide dies used for drawing steel tubes and those for drawing or sinking tubing of copper as will be noted from Figs. 3 and 4. Dies for copper represent a cross between steel tube sinking and steel tube drawing dies. To avoid chatter, the approach angle in such dies is blended into the bearing with a large radius. This is not the case with steel tube draw dies. For copper, there is little difference between drawing and sinking dies and these may be used interchangeably.

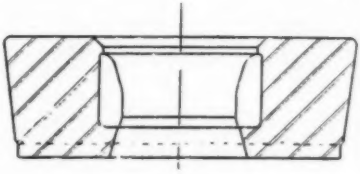


Fig. 5

Cases for carbide tube drawing dies are generally of tapered design (see Fig. 5). This insures firm seating of the dies, permitting smaller die depths to be used, with consequent ability to shorten the length of tube to be pointed. It also makes a backing plate unnecessary. The undercut shown on the die case in Fig. 5 is provided to simplify chucking when reconditioning dies.

Die Reconditioning

Usually when carbide nibs wear oversize in draw dies, the practice is to re-cut the nibs up to the next larger tubing or draw diameter. When sinking dies wear oversize, the usual practice is to sharpen up the angles, bringing the work back to size again, since the diameter of the work, in sinking, is dependent more on die angles than on die size—with the tendency for the work to run toward the small size.

Die Selection

Since carbide dies can be reconditioned fairly simply today with standardized equipment available from carbide die producers, most mills recondition their own tube drawing dies. An added advantage of such a pro-

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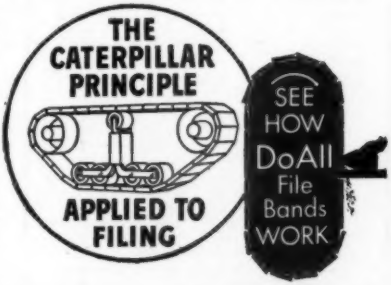

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cedure is that it permits the mill to purchase tubing dies in rough cored or drilled form, for finishing by the mill itself, thus materially reducing initial die cost.

Selection of die sizes when tooling with carbides depends on mill conditions. For dies above 1" it is normally most economical to figure on one or two re-cuts to larger sizes. Mills not having larger sizes to run would find it most economical to purchase dies at their maximum size, of course.

Lubrication

Fundamentally the better the lubrication and the lubricant, the longer the die life. Apparently carbide dies are not very critical, however, as to the method of applying the drawing compound. There is little difference in this respect between carbide and steel dies, and practices differ rather widely. In some mills, tubes are dipped in the compound before drawing. In others, a stream of compound is directed right at the die while mandrels are drilled to lubricate the ID of the tube under pressure as well as the OD. In some mills a concentrated form and in others a dilute form of dope is used—all with apparently equal success.

War Shipments Pictured

Well illustrated and informative, issue No. 8 of Acme Process News, shows how a wide variety of war shipments are protected in transit. Included are details of the strapping of such items as lend-lease food supplies, cranes, candy, bricks, furnaces, cargo trailers, textiles, medical supplies and other products. Another article reveals how one manufacturer, faced with a shortage of bolts, was able to cut that particular cost by 86%. Women operators of strap-applying equipment are illustrated on one of the pages and should be of special interest to manufacturers who are considering employment of female help for strapping shipments. Copies of this and succeeding issues may be obtained direct from Acme Steel Co., 2821 Archer Ave., Chicago.

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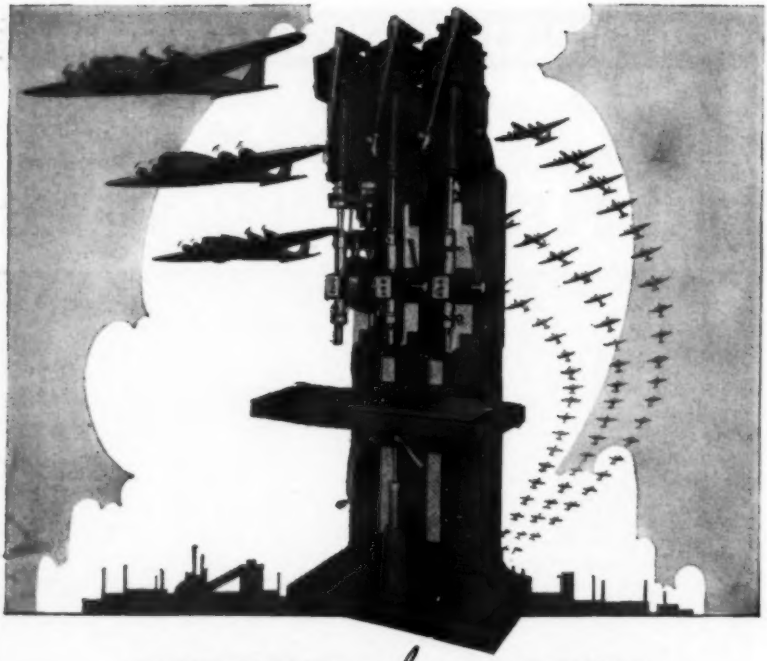

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Aspects of Modern Milling

(Part III)

By JOHN E. HYLER

IT is not possible to estimate accurately the degree of efficiency that has been added to milling machine practice as a whole, thru the use of improved cutting tools, but it is known to be very great. Once a given firm has started to use high speed steel instead of carbon, you will find them holding closely to the better steel, or going on to other cutting materials that are still better for certain specific uses. It is seldom indeed that they will ever go back to the older types. Especially in times like these when speed is vital. The same is true after a man has commenced using carbide tools as in face milling, for instance. It is necessary that careful attention be given to the grinding of carbide tools, but explicit directions for grinding and handling are available, and standard or converted standard tools may be used in any good inserted-tooth facing mill.

For those who like cutter material with greater wearing qualities than high speed steel, and yet do not care to go in strongly for tungsten carbides, materials have been developed which fit right in between. These are better in case the tools must be used where operating rigidity is not quite everything it should be. I certainly do not advise the use of milling machines that are badly worn or that lack rigidity for any other reason, but it is interesting to know, in case of emergency, there are materials that will stand shocks somewhat better than the tungsten carbides. These special alloys are available in a wide variety of tipped tools suited to milling purposes, and are known by the trade name of Speedaloy. Rexalloy is another popular material suitable for use on alloy steels with a chromium or nickel content.

We have all heard that there is at present a tungsten shortage. Just how serious that shortage may be, I do not know, but I do know that in many cases the amount of tungsten used can be lessened in cutting tools, without serious effects, by the inclusion of other materials in suitable proportions.

Take, for instance, a special type of high speed steel which features the use of molybdenum. Makers of this tool steel, which carries the name of Mo-max to remind us of "moly," claim that less than 2% of tungsten included, together with the molybdenum, has produced tools showing much greater efficiency than some milling tools incorporating 18% tungsten. If that be true, and there is no reason for doubting, it means inevitably that molybdenum will have an increasingly important place in modern milling practice.

Time-honored and time-established theories are upset now and then in every field, and in some cases it is found so in milling machine practice. Always, we have been taught that milling cutters must have a certain forward pitch to the tooth faces, otherwise known as a rake angle, to give them the proper bite into the material being machined. We were told and taught that this rake angle varied for different materials being machined, running the gamut from 20 degrees for mild steel or malleable iron all the way down to a 6 or 8 degree angle for certain nickel chrome steels.

Now comes a process (and one established in actual practice) that shatters our thinking in regard to rake angles on milling cutters. A certain tool-tipping material known as Firthite is used in connection with the process, which actually contemplates the use of a 10-degree **negative** rake angle, in connection with a negative helix angle, for milling alloy steels. This is, you will understand, of the nature of a scraping cut, and the face mill so designed and fitted is operated at a very high speed, about 10 times what the ordinary face mill would run on any given job. The remarkable thing is that the feed may be greatly increased (tho not in full proportion as to relative rotary speed of the mill-


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ing cutter) and much higher production realized.

Metal Specialists Sometimes Furnish Heads

It is not at all unusual that those who have gone to considerable expense in the development of high grade cutting materials, should be desirous that the tools be used under the conditions most favorable to maximum efficiency. In some cases, I find that in order to accomplish this, manufacturers of milling cutter materials have furnished heads for the use of those same materials. This allows them to incorporate just the rake angle and the helix angle, in the case of facing mills, that have proven best with their materials. One manufacturer of a very high grade steel-cutting carbide, known as Kennametal, also furnishes facing heads known as Kennamills to carry the tools. Facing heads for both roughing and finishing cuts are furnished by this maker, the finishing heads having a greater positive rake angle, and a greater negative helix angle, than is used for roughing heads.

Possibly one of the main factors which has operated in the past, to prevent users of various types of milling machines from stepping over to the use of better cutting materials, has been the thought of tool-changing frequency. A man reasons on his particular milling machine, there are so many tool changes and setups that much of the time is inevitably setup time. Therefore he may doubt whether or not he can reap the advantages of better cutting materials sufficiently to justify the investment. Under the old regime, that was true to a considerable extent, but it has been exploded as a theory by many who do have many changes to make, and who employ suitable adaptors for the making of quick changes.

Such adaptors are profitable both from this standpoint and in their own

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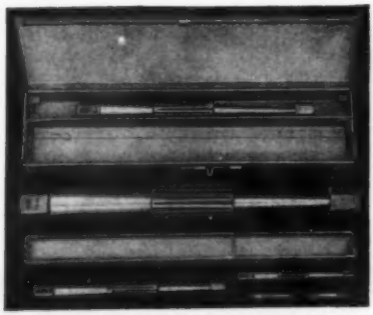

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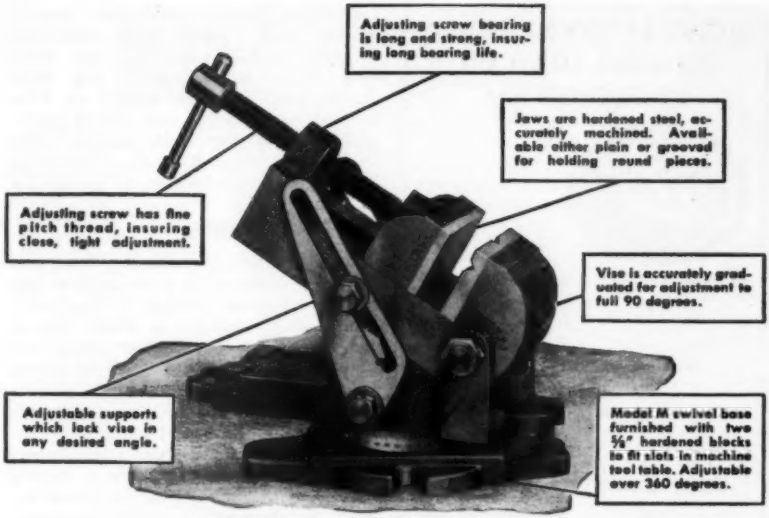
right. As furnished by one outstanding builder of milling machine adaptors, there is provided in some cases a chuck which may be permanently installed. This is particularly suited for receiving various adaptors to go with it. It is claimed that some of the tool changes may be made readily in 5 seconds. Think it over. How many changes can you make in a working day without seriously extending your running time?

Even in cases where the margin of time saved thru the use of carbide tools is not great, the fact that there is a margin saved is now sufficient argument, under the stress of wartime demands, to cause many manufacturers to swing over to carbides when available to them. Milling machine cutters, tipped with tungsten carbide as furnished by representative makers, should always be considered carefully, especially by those equipped with high grade milling machinery that is relatively vibration-free, before electing to continue with a less productive cutting material. Some firms have them available promptly, in styles and grades suited to nearly any machining need or problem.

"But," says someone, this is all fine with reference to surfacing and straight cutting problems as they relate to the milling machine, but how about the use of tungsten carbide in the making of various cuts that cannot be handled with any standard tool?" True, that angle is also important. You may be sure that this end of things has had careful attention, tho those who have given it attention might be regarded as cutter designing specialists. For such tools, designed from a description and an analysis of the particular cutting conditions to be met, very often call for the consideration of special factors, which are not involved in the making of milling machine cutters from the ordinary standpoint. One firm I know,



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It can be used on a drill press, a milling machine, or a grinder, eliminating clamps, wedges or other make-shift methods, and permits setting up for angle work accurately and quickly.

It can be set at any desired angle up to a full 90 degrees by adjusting it to the proper degree and locking the adjustable supports.

Every part of this vise is accurately machined. The base, body and sliding jaws are of semi-steel castings. The jaws are hardened steel and can be supplied either plain or grooved.

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Model	Width of Jaws	Depth Jaws	Opening Jaws	Overall Length	Kind of Jaws	Weight Vise Only	Can be supplied with Model M or Model B swivel base or without base.
000	2½"	1 7-16"	2½"	6¼"	Hardened Grooved	9½ lbs.	

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furnishing formed and other special milling tools tipped with tantalum tungsten carbide, employs men with very broad experience in just such applications, and one cannot do better, when confronted with special problems, than to turn them directly over to such a firm. It is the short way to maximum production in practically every case.

Tool Steel Specialists

It is not infrequently the case that shop management is more or less "up a tree" in the matter of the right tool steel to use for a given type of milling cutter, or even for other types of cutters. Sometimes it seems almost a toss-up between one form of cutting material and another. In such cases, it is really best, lacking the presence of men in the shop who are experts on different steels and cutting materials, to submit your problems exactly as they are to steel specialists. Remember that such firms have a reputation to establish and sustain. That fact is a safeguard against any chance they will take your problems under advisement in any hap-hazard manner. As one such tool specialist has aptly put it:—"So much depends upon so little," when it comes to the selection of a proper tool steel. The "little" is just the thing that is likely to be overlooked by the novice.

One factor you will be likely to discover, if you set out to study the use of various cutting materials versus materials to be cut, is that certain materials generate far more heat than others in the machining process. Stainless steels offer a problem in this respect, and there are other materials distinguished by their high degree of heat generation. When you are machining such stock, you will do well to consider the use of a cutting material that has shown more than ordinary efficiency on just such work. One such is a non-ferrous material,

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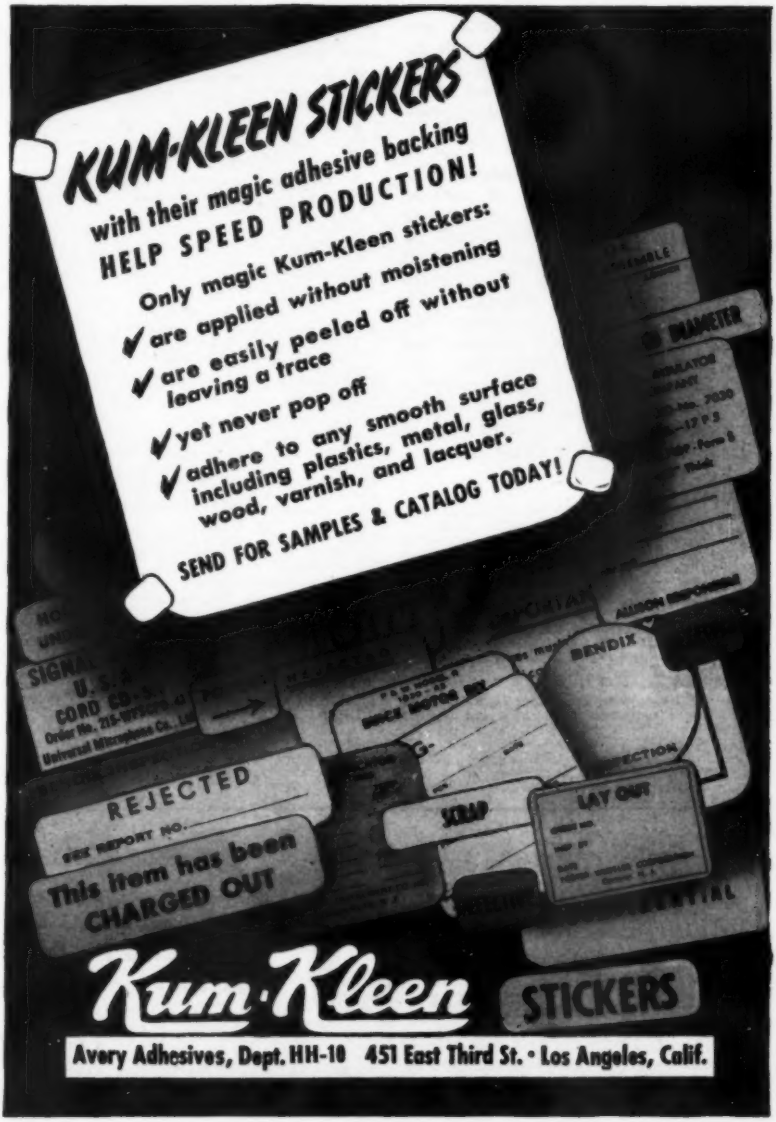
made up of chromium, cobalt and tungsten. It has a very high degree of stability and hardness even when it becomes very hot in the machining process. Designated as Rexalloy, this material is claimed to show increased cutting speeds over high speed steels on various materials, making its best showing on materials which generate a high degree of heat.

So great has become the interest centered around better cutting materials that one outstanding maker of tools, who had for years been called upon to furnish cemented - carbide tipped tools as applied to milling machines and other purposes, found it necessary to expand their facilities in this direction. The decision to do so led to the formation of a separate division of their business, just to take care of the demand for such tools, and a name was adopted which adequately marks them as cemented carbide specialists. This firm supplies cemented carbides of a number of the types mentioned in this article, such as Vascoloy-Ramet, Carboloy and Firthite. They stock a very complete line of all that might logically be called standard tools. An advantage of dealing with such a source of central supply is that they have the various different carbides available at hand, are not interested in pushing one more than the other, and are in positon to give unbiased information as to which one is superior for any given job or application.

Carbide milling tools of any kind will need to receive careful treatment in grinding and lapping. The highest class milling machine operators have always held that even in the case of ordinary carbon steel or high speed steel cutters, it is important to get a good polish on the tools after grinding. This helps the tools to clean themselves of chips more readily, and prevents chip-clinging. Carbide tools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deserve far closer attention than ordinary types of tools, and you will do well to see that they receive it. Properly used carbides will give you higher production on your milling machines.

Grinding machines particularly adapted to the grinding of carbide cutters are on the market, and should be used for the purpose. Some of these have motors directly mounted on a double-end spindle, and a wheel at one end for rough grinding, with the finishing wheel at the other. As a final touch for your carbide tool edges before putting them into operation, you will be interested to know that there is a special diamond lapping oil available which will help you to give them a far better finish.

EDITORIAL NOTES:

Carboloy tools are sold by Carboloy Co., Inc., 1139 E-8 Mile Ave., Detroit, Mich.

Speedaloy as mentioned descriptively may be had from Circle Tip Tool Co., Inc., East Orange, New Jersey. Rexalloy is supplied by General Tool & Die Co., 62 Franklin St., East Orange, N. J.

Cutting material known as Mo-max with molybdenum content is a product of the Cleveland Twist Drill Co., Cleveland, Ohio.

Kennametal and Kennamills are developments of McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa.

The milling machine adaptor sets, making for fast tool changes, are made by Milling Machine Adaptor Corp., 1400 West Fort St., Detroit, Mich.

The firm mentioned which keeps carbide tools available for quick delivery in nearly all forms for needed machine operations is the Tungsten Electric Corp., 562 39th St., Union City, N. J.

Formed and special milling cutters, tipped with tantalum tungsten carbide, are furnished by Vascoloy-Ramet Corp., North Chicago, Ill.

Another firm which furnishes tungsten carbide cutters in many forms is the Super Tool Co., 21640 Hoover Road, Detroit, Mich.

A tool steel specialist always ready to make helpful recommendations is the Jessop Steel Co., Washington, Pa.

Willey's Carbide Tool Co., 1344 W. Vernor Highway, Detroit, make many types of tools.

Firthite as described for negative-rake-angle face milling is sold by the Firth-Sterling Steel Co., McKeesport, Pa.

The tool firm which supplies cemented-carbide tools made of carbides from different firms, and which has established a special division of their business for the purpose, is Carbide Fabricators, Berkley, Mich. This firm is a subsidiary of the Morse Tool Co., Detroit.

The carbide tool grinder descriptively mentioned is one made by Thomas Prosser and Son, 120 Wall Street, New York City. Other excellent grinders are made by Hammond Machinery Builders, Inc., 1614 Douglas Blvd., Kalamazoo, Mich. Ex-Cell-O Corp., Detroit, Mich., Criterion Machine Works, Beverly Hills, Cal.. K. O. Lee & Son, Aberdeen, S. D., Wm. Sellers & Co., Philadelphia, Pa., Standard Electrical Tool Co, 1954 W. 8th St., Cincinnati, O., Cincinnati Electrical Tool Co., 2702-9 Madison Rd., Cincinnati, O., T. C. M. Mfg. Co., Harrison, N. J., Willey's Carbide Tool Co, 1344 W. Vernor Highway Co., Detroit, Mich., Baldor Electric Co., 4368 Duncan Ave., St. Louis, Mo., and others.

The diamond lapping oil mentioned as applicable for lapping carbide tools is furnished by Stadoil Mfg. Co., 617 South Beacon St., Dallas, Tex.

A very helpful book on the manufacture and maintenance of cemented carbide milling cutters has been issued by Cincinnati Milling Machine Co., Cincinnati, O.

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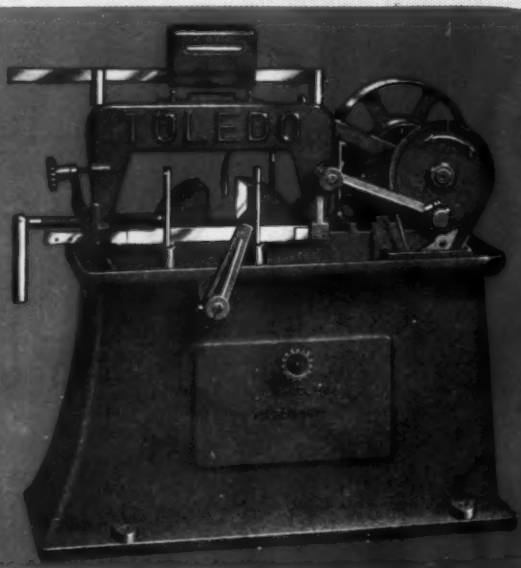

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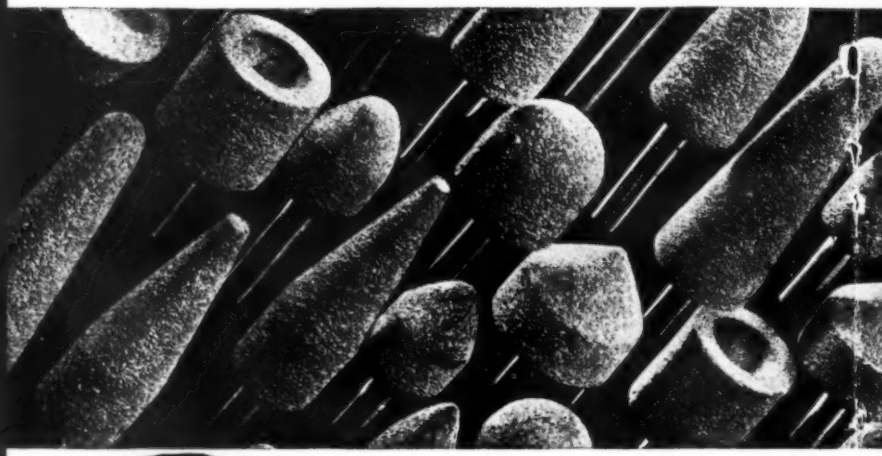

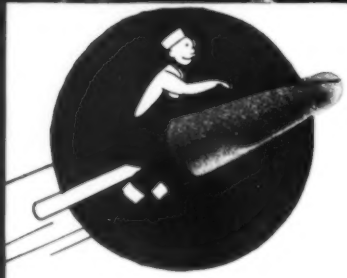

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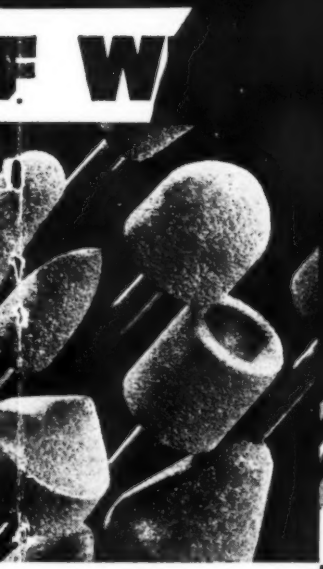

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Rounds	8" dia.
Speeds: ft. per min.	60, 90, 130
Motor	Specifications are optional

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Wells METAL CUTTING BAND SAWS

A Manpower Inventory—NOW

By Major General Lewis B. Hershey, U. S. A.
Director of Selective Service

MANPOWER is a most important strategic material of today. Every employer should make a prompt inventory, appraisal and analysis of the manpower in his own plant as he would inventory his stock pile. In order to keep production going and at the same time furnish men for the armed forces, industry should now establish an orderly replacement program.

In order to obtain temporary deferments for essential men while training women, young men, older men, and physically handicapped or those with a high degree of dependency, the employer should know the fundamental principles in the operation of his local Selective Service Board. Certain steps should now be taken by each employer. He should know how many men on his pay roll are between the ages of 20 and 45. He should investigate the classification of every one of those men. On the basis of such an inventory, he should prepare to plan ahead and train men for replacement of those who must necessarily enter the armed forces if we are to have the sort of army which can win the war.

Deferments Temporary

Deferments, granted so that employers may train women or men not liable to early induction, are temporary deferments; they cannot exceed 6 months and in many cases may be for only 30, 60, or 90 days. The Army today has to train a bomber pilot within a period of 8 months to operate a very technical machine with an instrument board which puzzles an expert. Why, therefore, should industry insist that it can take 2 or 3 years to train men for industrial tasks not nearly so complicated?

The fundamental purpose of every deferment of a registrant is to allow an employer to train a replacement. Only in a few rare instances can an employer expect to have these temporary deferments continued for more than the 6 months' period. These are only in cases where an abnormally long period of training is required for a replacement and the 8 months needed, in which a bomber pilot can be turned out now, is something to remember in this connection.

Employer's Responsibility

Employers may seek the deferment of their necessary men with or without their consent. Here is how they go about it. On page 3 of the Selective Service Questionnaire (Form 40) which is sent to each registrant before he is classified is the following:

> **Instructions:—If your employer believes that you are a necessary man in a necessary occupation, it is his duty to fill out form 42A requesting your deferment. You may also attach to this page any further statement by yourself which you think the local board should consider in determining your classification.**

Such statement will then become a part of the questionnaire.

This is on all the questionnaires distributed during the past 6 months. The fact that the Selective Service System now specifically mentions the filing of Form 52A as the manufacturers' duty is a clear indication of the Selective Service System's view on the responsibility of each employer in this matter.

The employer can obtain Form 42A at the local board and the local board will consider the employer's request when the form is properly filled out and signed.

If such request should be denied because the man, after consideration of the claims offered for him, is not considered indispensable to the company's operation, and is needed more in the armed services, the local board will advise the employer of its refusal of such an occupational deferment.

The local board does this by sending to the employer, at the same time it notifies the registrant of his classification, a Form 59.

May Make Appeal

There are 10 days after Form 59 is mailed by the local board to the employer during which the employer can appeal the registrant's case. The registrant will not be ordered to report for induction during this 10-day period.

In order to take an appeal, the employer simply has to sign his name to Form 59 which he has received, and return it to the local board; or in case the Form 59 is not received from the local board, any written request will have full value to make such an appeal effective.

When Form 59 is returned by the employer, the appeal procedure becomes automatic. All necessary forms are available at the local board in the employer's immediate vicinity or at the office of the State Director of Selective Service.

If the local board and the appeal board deny the appeal for the occupational deferment of a key man, the employer many then bring the matter to the attention of the State Director at the State Selective Service Headquarters, with the request that the case be reopened or appealed by him to the President.

Definite Duty

A double duty rests upon the employer. He should personally know what his manpower situation is. He should not leave the job to a minor employee to decide who is necessary. The employer who delegates the task of filing a request for deferment to a clerk, or the executive who does not make a complete inventory of his whole plant today, is negligent. Likewise, the employer who files requests for deferment of men who can be replaced by women, or others, is keeping reinforcements out of an Army which is battling for us all. The employer engaged in essential war production, who has been required to expand his plant greatly and who then fails to request deferment for his key men is also negligent.

A good rule to follow:—Don't ask deferments for any men who can be replaced by training another individual not likely to be eligible soon for service in the armed forces.

Make an inventory, request deferment for any man whose immediate going into the armed services would retard production of vital war material or other services essential to the war effort, or who is needed to maintain national health, safety and interest.

Only when an employee is working in a critical occupation within an essential industry should a Form 42A be filed for his temporary occupational deferment.

Make Replacements

Yes, an inventory within a man's own plant is called for; also an appraisal and analysis of the manpower in the community. There is many a man over 45, or a man physically hand-

Last month alone . . . Genesee delivered more "Tomahawk" Quality cutting tools to Industry for the war effort than it produced in the entire year of 1939.

YET, GENESEE TOOL COMPANY is not a "war baby". It was incorporated in 1934 to supply the needs of automotive companies in Detroit, in Lansing, in Flint, in Pontiac. . . . Growth through the first years was purposely gradual. In those first years Genesee acquired and developed an organization second to none in the designing and production of cutting tools.

In recent years Genesee's growth has been accelerated. Its original plant was expanded, re-equipped with the most modern of tool production equipment available . . . a second plant was acquired and equipped . . . a corps of trained field representatives was appointed, covering virtually every major industrial center.

Today it ranks as one of the most modern tool companies in the country, producing practically every type of tool used in industry . . . H.S.S. and carbide . . . standard and special . . . for turning and forming, reaming and counterboring and milling, etc.

We will be glad to send you a streamlined condensed catalog of Genesee tools. Ask for catalog No. GT-42 H

GENESEE TOOL COMPANY

F E N T O N , M I C H I G A N

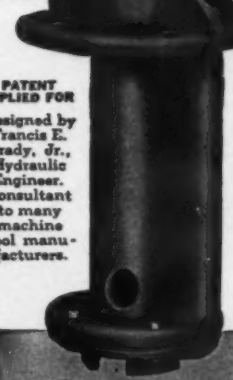
★ Registered Trade Mark

icapped, or a woman who can do the job that the 23-year-old boy is doing who took a 12-weeks' course at a learn-quick school.

There are not more than sixty million people in this country who are capable of effective productive effort. These men and women represent our total manpower available to win the war. They must do everything that has to be done in a total war; maintain transportation, communications and utility systems, maintain public services, grow food for ourselves and our allies, mine the metals and produce the raw materials, fabricate and produce the amount of consumer goods necessary to maintain even a restricted national life and the supplies, weapons and munitions of war. Also, most of all they must provide for the men who land on strange shores in far places, the men who carry the fight to the enemy on a multitude of far-flung frontiers. The rest of the population, who mine raw materials and produce the weapons with which these men fight must be a self-disciplined team working in unity. The individual personal convenience, comfort or pleasure, or the convenience and ordinary leisurely replacement programs of the employer, will have to be given progressively less consideration as the war gets tougher and the casualty lists grow.

When we hear of the big armies we are going to raise, we must all remember that it takes at least 5 men or women to produce what they eat, use, fight with, and wear. With less than sixty million availables in this country, these figures merit deep and serious consideration.

READY TO WIN THEIR SECOND WORLD WAR—Machines such as these helped win World War I and now as scrap are being readied for their second hitch with Uncle Sam, in response to the WPB appeal for scrap. Workers in the photo are dismantling old and obsolete equipment, collected in the recent scrap drive at The Baldwin Locomotive Works, Philadelphia. From the scrap pile, the iron and steel will be rushed into production of tanks, guns and other material of war. Baldwin officials estimate the scrap effort will result in salvaging 1800 tons of metal, sufficient to produce 60 of the M-3 tanks which the company is now hurrying off its assembly lines. Machine parts not entirely obsolete are being reclaimed and rebuilt.



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The most adaptable pump of all . . . MODEL 7500 by BRADY-PENROD, INC.! This pump may be made an integral part of any grinder, lathe, cutting or drilling machine or can be easily moved from job to job as needed. A plate adapter is available to fit any tank or base opening. This model is a motor-driven open-impeller centrifugal type, submergable, with an outside discharge. Internal piping is eliminated; external piping reduced to a minimum. This simplification saves engineering and assembly labor.

THREE DEPTHS SUITABLE FOR ALL MACHINES

MODEL 7500 is available with 3 different depths from flange - 4⅞", 9", and 15".

Motor capacity - ½ H.P. to 1½ H.P.

Controlled flow - from 4 g.p.m. to 100 g.p.m. with any standard coolant fluid. Suitable for use with abrasives. Special depths available.

Long used as standard equipment by machine tool manufacturers, BRADY-PENROD Pumps (6 other models) are proving their reliability and high hydraulic efficiency in hundreds of locations today. Write or wire for details.

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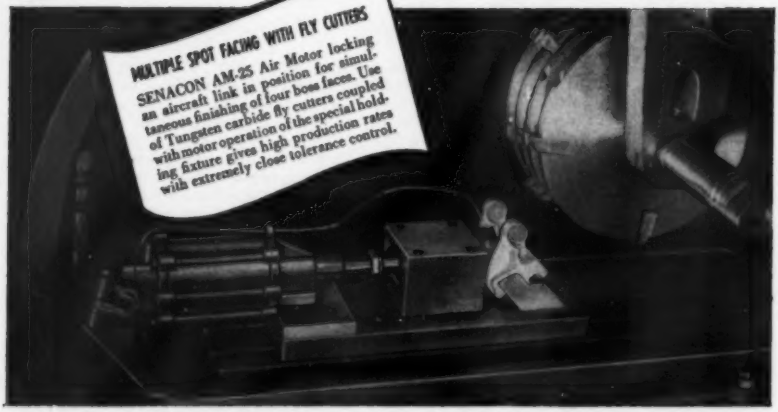
TOUGH FIXTURE PROBLEMS MADE EASY WITH Senacon AIR MOTORS



Tool Engineers Everywhere Are Finding These Versatile Power Units Indispensable in the Design of Specialized High Duty Fixtures

COMPACTNESS, flexibility and ease of control are inherent characteristics of the exclusive INTEGRAL valve construction of SENACON Air Motors.

These features are particularly valuable in the design of power fixtures which move with the main machine tool, such as holding fixtures for milling machine operations. In such installations the single air line connections, finger tip valve accessibility, and all around compactness of the SENACON Air Motor are particularly appreciated by the tool engineer.

Hundreds of SENACON motors are in daily use giving outstanding service on specialized installations of this character.

SENACON POWERED fixtures are high production fixtures. Every tool designer should be familiar with the possibilities offered by this extremely versatile tool. Write for our new catalog showing typical examples of SENACON Air Motors solving intricate tooling problems.

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PNEUMATIC MACHINE TOOL OFFICES

SPEED PRODUCTION WITH AIR POWER

Conservation

By ERNEST W. FAIR

TODAY it is not only good business but a patriotic national duty to save supplies and materials and economize in their use. Many materials, supplies, etc., in use in the shop are vital to our war effort, and must be conserved.

As if these facts were not sufficiently important, we have another additional point in that this is wise business management; with every executive's production costs mounting almost daily, there is no longer any excuse for waste or carelessness.

Here are a number of conservation methods being employed by several successful executives in their present shop operations; each and every one of which merits serious consideration by every reader of these pages. All will save against that possible shortage tomorrow . . . all will help keep production costs down . . . all will contribute to the success of the war effort.

Watch Measurements—This means a closer check on measuring for accuracy (in use of oils and greases for example) and to make sure only the right amount is used on each occasion. Steps to prevent wastage during such operations are also advisable.

Check Storage Facilities—Often supplies are lost thru improper storage. Accidents which may cause containers to upset and their contents to be spilled are most frequent. Spoilage, leakage, or deterioration may also occur thru improper storage. It is also advisable to check the storage spaces or rooms every month or so to make sure they are clean and weatherproof and to check electrical wiring therein in order to safeguard against possible fires.

Avoid Materials Waste—Using a piece of metal an inch too long and resultant loss of an inch of that material after machining is as wasteful as pouring oil down the drain pipe. Such ordinary careless actions on the part of workers that cause such wastage can be stopped by more attention and emphasis on the saving angle. Employees should have this constantly impressed upon them, day and night.

Mistakes Mean Supply Waste—Mistakes should be condemned, and in some instances penalties inflicted, for some of the most costly wastage of supplies in the average machine shop can be charged to errors of judgment. It is serious business to waste supplies, no matter what the form of wasting.

Conserve Electricity — Electricity is becoming one of the most vitally essential of our war supplies; its waste by any one is inexcuseable and unnecessarily expensive. Machines should not be left running when their task has been completed. Signs should burn only when needed and electric lights should be turned off immediately when they are no longer required.

Shorter Lengths and Narrower Widths is a good slogan to impress

upon every workman in the shop; it is one more opportunity for savings. Here is a point where most of us have a tendency to be wasteful; one at which nearly every machine shop in the land can find opportunities for a considerable measure of conservation by more rigid control.

"Don't Use More Than Necessary" is a good sign to post all over the shop. Make sure every employee thoroly understands how a "little bit more" than is actually needed of any vital supply item means just that much waste. And those "little bits" don't take long to add up to a formidable lot.

All of these points are of importance. Many others will occur to every executive, from time to time, for wise executives will, in future weeks, be constantly seeking out methods by which they can save supplies and materials and make them last longer and go farther.

However, it is highly important not to overlook the part the employees may play in any conservation campaigns. The efforts of the executive himself will be pitifully small if he cannot obtain the proper spirit of watchfulness and cooperation on the part of each and every employee in the shop. Every employee of every machine shop in the country must be made to realize . . . The supplies we save now may prevent critical shortages later that can hamper our all-out war effort.

In all standard types and sizes

T-J DIE SINKING MILLING CUTTERS

are sturdy, hold a sharp edge and carry less breakage percentage. They meet even today's production requirements with more work between grinds.

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PURE TUNGSTEN CARBIDE DIAMOND METAL HONES

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SUPPLIED IN THREE DIAMOND GRIT SIZES

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WHAT THEY DO: To resharpen carbide tools. Stoning small radii on carbide tools. Dressing short angles or small radii on diamond wheels or abrasive wheels.

These hones are very fast cutting and have an extremely long shop life. They are very difficult to harm in ordinary use. Use kerosene or light oil as a lubricant. To resharpen, bring diamond face lightly in contact with a silicon carbide wheel for about 30 seconds to one minute. The silicon carbide wheel will grind out a small amount of the Tungsten Carbide binder and re-expose the diamond particles.

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A trial order will convince you of their worth.

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GENERAL TOOL & DIE CO.
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LARGER ELECTRODES

Speed War Production

USE of larger electrodes in arc welding is giving new impetus to war production in many factories and shipyards thruout the U. S.

In many instances, welding operations vital to this country's war effort, have been speeded up as much as 50% by the use of electrodes 1 or 2 sizes larger. In one instance, the increased speed amounted to 200%, with the aid of improved jigs and fixtures.

This was disclosed by A. F. Davis, Vice President in the results of a nation wide survey conducted by The Lincoln Electric Co., Cleveland. The survey was made to determine the response of users of arc welding to the company's appeal that welders use larger electrodes in the interest of the war effort as well as efficiency.

Responding to the survey, Robert Proctor, chief engineer of the Commercial Shearing & Stamping Co., Youngstown, Ohio, said that some of the company's arc welding methods, including the use of larger electrodes, helped it recently to win the Army and Navy "E" award for production. Use of larger electrodes increased welding speed from 40 to 55%.

"Quite naturally we were highly pleased over this award and since we feel that some of our arc welding methods materially aided us in winning this recognition, we would like to pass these on to others hoping that they may help the war effort," Proctor said.

"The use of the largest electrodes possible for each type of fabricated job is imperative if maximum production is to be obtained. For example, a 3/8" fillet weld on 1/2" mild steel plate formerly welded with 1/4" electrode, at 40 feet per hour of arc time, is now done with 3/8" electrode at 95 feet per hour of arc time. This increased our arc time efficiency from 40% with 1/4" rod to 55% with 3/8" electrode.

"A 1/4" fillet on a 3/16" plate, formerly welded with a 3/16" electrode at 8" per minute arc time, can be accomplished with 1/4" rod at 14" per minute arc time.

"By proper handling of the electrode, these larger sizes give excellent results even tho the first attempts often appear discouraging."

Also to cut welding time in the nation's factories, The Lincoln Electric Co. has introduced the "Fleet-Fillet" technique, which in many instances has increased welding speeds as much as 100%.

Experimenting with larger electrodes, some concerns found that they can be used on thinner metal than they had previously suspected. The 3/16 and 1/4" electrodes were used on metals as light as 1/8" in thickness.

Use of larger electrodes also has a tendency to cut down the number of passes necessary to make a weld. In many instances, learners on welding jobs are able to do satisfactory work

in shorter apprenticeship time, manufacturers discovered.

The highest increase in welding speed—200%—was reported by a manufacturer of belt reels. This increase occurred in shifting from ⅛ to 5/32" electrodes and imroving the set-up of the welding job.

Savings in cost ranged upward to 60%, were reported by a pipe manufacturer. A company making tractor idler rollers reported a 50% saving. An analysis of savings achieved was made by Machinery Mfg. Co., Minneapolis. Welding of stator frames in a horizontal position with 3/16" "Fleetweld 7" electrodes, required 3 passes. When a change was made to "Fleetwood 9" ¼" size, the same weld could be made in 1 pass with a 30% saving in cost. A total saving of 43% was achieved when, in addition to using larger electrodes, the company welded the stator frames in a welding positioner, which permitted downhand welds.

The Food Mfg. Co., Lakeland, Fla., making an amphibian tractor, analyzed the savings made on welds on the stern and catwalk. The stern has 132 feet of welding, which was formerly done with 5/32" electrodes. The time required was 6 hours. Shifting to a 3/16" electrode, the time was cut to 4 hours. Thirty minute per 140-foot unit of structure was saved when a shift was made in welding catwalks.

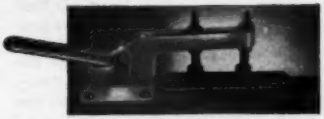
Other companies reporting increases in welding speeds thru use of larger electrodes are:—Teleweld, Inc., Chicago, structural and penstock welding, 100%; Stevens Metal Products Co., Niles, Ohio, 150%; Aetna Iron & Steel Co., Jacksonville, Fla., 73%; Downington Iron Works, Downington, Pa., 22%; Allith-Prouty, Inc., Danville, Ill., 66%; Butler Mfg. Co., Kansas City, Mo., 20%; Clyde Iron Works, Inc., Duluth, 15%; Calvert Iron Works, Inc., Atlanta, Ga., 15 to 20%; and St. Paul Structural Steel Co., 66%.

4 More KNU-VISE FIXTURES To Speed Up Your Clamping Operations

Another forward step in clamping operations! In fact, four forward steps—each contributing a definite speed factor in production.

★ **MIDGET CLAMP.** Improved Model. Toggle bar strengthened, with bolt retainer now integral with bar. Spindles uniformly centered. Exceptionally practical in holding small parts where heavy clamping pressure is required. Spindle has rubber cap.

★ **PARALLEL CLAMPING PLIERS.** The extended parallel jaws aid clamping efficiency by exerting pressure uniformly over greater area. Particularly effective in gluing plywood. Two-spindle adjustment. Already extensively used in aviation industry on plywood gliders and training planes.



★ **U-SHAPED TOGGLE BAR.** Permits simultaneous clamping of many parts regardless of their thickness. Two spindles with rubber caps, adjustable horizontally and vertically, are pre-set at required locations and remain in these fixed positions during continuous operations. Handle in horizontal position when closed.

★ **L-CLAMP.** Designed for clamping small parts, either in assembly or production jobs. For use in limited spaces or where large throat capacity is required, such as in the clamping of L-sections in aircraft construction. Handles at right angles to clamping position.

Perhaps YOUR plant can make advantageous use of one of these or other Knu-Vise features. Ask for a demonstration in your plant.

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"Let's Talk Shop!"

Automatic Lathes Important to the War Effort

By JOHN E. HYLER

THE versatility and production speed of automatic lathes are telling heavily in the all-out effort for war production. Years of production experience on the part of those engaged in building and in tooling automatic lathes gives the immediate answer as to just what is best in the way of cutting tools, directions of tool travel, and formers for these machines, and engineers connected with the plants engaged in building automatics are developing methods that are setting standards of speed and accuracy never attained before. Just lately, I noticed a couple of automatic lathe setups, one of which was for machining automatic rifle barrels, and the other for aircraft cannon.

The progress made in the automatic lathe field is very interesting. A few years ago, when I was employed in the Engineering Department of R. G. LeTourneau, Inc., a splendid automatic lathe was designed and built by them for use in their own shops. This type of lathe, I understand, is doing yeoman service in spurring war production, in which the LeTourneau plants are heavily engaged. At the time the lathe in question was developed, there was some thought of putting it on the market, but I do not know whether there has been time available for production, for they have been very busy on many other types of equipment.

Automatic lathes of the type which automatically return the carriage and the cutting tools to the starting point on conclusion of the cut have been very helpful, enabling an operator to handle 2 or more machines without excessive effort. Some of these machines have been much simplified in the matter of setup time. Cutting down on the time needed for setting up, naturally brings smaller-lot jobs within the practical range of the machines. Step-facing, step-boring, contour facing and turning, and multiple-diameter work, all represent jobs that may be handled to a very high degree of production advantage on the automatic.

Do you have jobs you have been longing to feed to an automatic lathe, but which you have felt are too small to pay out on this basis? Small gear blanks, bushings, and any number of other small turnings fall directly within

the production scope of a small automatic lathe I have noticed, that is capable of very high speeds, all the way up to 5,000 rpm. This little automatic is capable of being set for very fine feeds when that is desirable, such as are suitable for diamond turning. Feeds as fine as .001" per revolution are obtained, and great versatility in such a machine is possible, for it can be fitted with as many as 3 former slides when desired, so that complicated work may be handled at a single pass.

Some of the jobs handled at high speed on automatic lathes are more than a study in tooling. They require a close study of cutting, and of proper cutting coolants. This is especially true in cases where a great deal of cutting is being done on a limited amount of surface, leading to the generation of much heat when done at speed. Consider the cooling fins on aviation engine cylinders. In one case that came to my attention, 3 gangs of 28 tools each were being used in an automatic, yet in spite of the fact that 28 tools were cutting at once, the cutting action was such, due to the application of the right coolant in the right way, that there was no jamming and no tearing of the fins.

Hydraulic feed is used on some of our modern automatic lathes to a high degree of advantage. On one machine engaged in machining shell bodies, both formers are traversed by tools that are advanced hydraulically, and the hydraulic setup is such as to incorporate a pilot valve working in conjunction with the trip dog. Rotation of the pilot valve by the dog throws the feeds into rapid traverse for returning the carriage and the rear slide quickly to their starting positions. The tailstock spindle traverse on this machine, and also the expanding mandrel on which the shell bodies are held for turning, are both operated by means of foot-treadle valves at the floor line.

Some automatic lathes have naturally been designed from the standpoint of versatility, for there is a shop here and there where a high versatility rating for a machine is of greater importance than production speed, strictly as such.

ALONE IN ITS FIELD!

with all these Unmatched Features!

PORTER-CABLE 7" SHAPER

AVAILABLE NOW!

Porter-Cable's new 7" Shaper is the fastest cutting, strongest, most versatile shaper of its size ever developed. Look at all the advantages listed above! In addition you get easy operation, speedy set-up, and fine precision. It has the weight and rigidity, the wear-saving chain-and-sprocket drive, to handle unusual power and heavier cuts . . giving capacity that will take many jobs off your larger machines. You can't find a smoother-running, more chatter-free shaper, nor one with anything like its low operation and upkeep cost. Find out more about it from your local Porter-Cable man or write us for full details and price.

See it demonstrated at the National Metal Show

NEW LIFE, NEW JOBS FOR YOUR OLD MILLER

In as little as 3 minutes Porter-Cable Milling Machine Attachments will convert your old standard machine into an adaptable miller with full accuracy for intricate operations. Just the thing for complicated experimental work and tricky tool room jobs, especially if you have any of these jobs to do:

- Mill Compound Angles
- Spot Face on a Bevel
- Sink Horizontal Keyways
- Mill T-Slots
- Cut Internal or External Cams
- Contour Radii or Angles

Write for information and prices.

PORTER-CABLE MACHINE CO. 300-10 Exchange St. Syracuse, N.Y.

There are automatic lathe builders who are prepared to furnish a very wide selection of independent and automatic feeds for various slide tools. In consequence, their machines may be tooled to handle practically any cylindrical part to be found.

Look around in any progressive machine shop today, and you will find some model of an automatic lathe doing its bit in an outstanding way, and in some very important way. Their contribution to the war effort would be difficult indeed to estimate. When you consider that a machine engaged in turning airplane valve tappet guides is producing at the rate of 38 per hour, that it was held to this schedule over a period of 11,000 hours with only 12.7 hours of down time, you will agree with me that the automatic lathe is certainly doing its part to "Keep 'Em Flying."

EDITORIAL NOTES—

The 2 automatic lathes mentioned, one of them set up for machining automatic rifle barrels and the other for aircraft cannon, were Fay automatics, made by Jones & Lamson Machine Co., Springfield, Vermont.

The automatic lathes developed by R. G. LeTourneau and built in his own Peoria shop when I was there, were named Tournamatics.

Automatic lathes in which setup time has been reduced, suitable for set-facing, step-boring, contour facing and turning, or multiple-diameter work, are made by the Monarch Machine Tool Co., Sidney, Ohio.

The little automatic lathe that can be speeded to 5,000 rpm, with a feed as fine as .001" per revolution, and which may be fitted with as many as 3 former slides, is the "Imp," made by Seneca Falls Machine Co., Seneca Falls, N. Y.

The particular job mentioned which involved 28 tools cutting at once on cooling fins, was done on a Jones & Lamson Fay automatic lathe, using a coolant supplied by The Texas Co., 135 East 42nd St., New York City.

The machine using a hydraulic feed for carriage and rear slide, and with the other adaptations mentioned, is one made by Sparks Machine Tool Corp., Norwalk, Conn.

Automatic lathes having an exceptionally high versatility rating, and providing a wide selection of independent and automatic feeds for various slide tools, are made by Gisholt Machine Co., 1219 Washington Ave., Madison, Wis.

The machine setting the record mentioned on airplane valve tappet guides, is one built by Cone Automatic Machine Co., Inc., Windsor, Vermont.

The Lipe Carbo-Matic Lathe, made for high speed hydraulic automatic operation with the

latest carbide tooling is made by Lipe-Rollo-way Corp., Syracuse, N. Y.

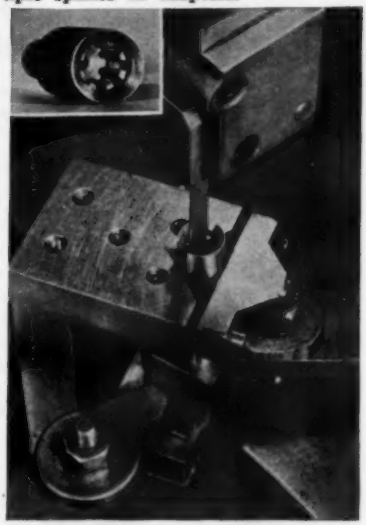
Special lathes for high speed gun and shell production are made by R. K. LeBlond Machine Tool Co., Cincinnati, O.

Full hydraulic automatic multiple tooled lathes for shell turning and other high production jobs are made by The Norwood Engineering Co., 94 No. Maple St., Florence, Mass.

Automatic shell turning lathes have also been developed by Morey Machinery Co., Inc., 410 Broome St., New York City.

Multiple Splines

A slotting head attachment (Slotmaster—made by Experimental Tool & Die Co., 12607 Greiner St., Detroit, Mich.) that may be adapted to round or flat-on-round overarm milling machines may be used for cutting multiple splines in adapters.



The adapters are clamped on a "V" block which in turn is mounted on the rotating table on a milling machine. A slotting tool, ground to the exact dimension required is fastened to the clapper box tool holder and the job is ready for slotting. It takes a few minutes to cut each spline, whereupon the adaptor is rotated to a new position. And the operation is repeated until all of the splines are cut accu-

STOP THE DAMAGE CAUSED BY DUST AND DIRT—USE THE

Filtaire PORTABLE DUST COLLECTOR

The FILTAIRE Portable Dust Collector will soon pay for itself when used in conjunction with dry grinding and polishing operations. It is especially valuable in shops where no central dust collecting system is available. These portable units STOP THE DAMAGE caused by dust and dirt by cleaning all air through an inexpensive, replaceable, fireproof filter.

The Filtaire saves on the fuel bill too, because all clean air is recirculated inside—it does not exhaust valuable warm air out of the shop.

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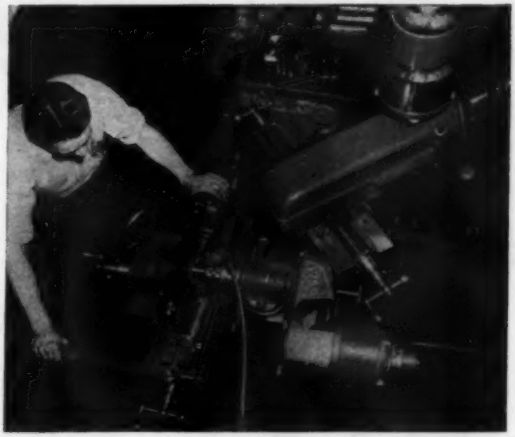
J-B TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS

rately dimensioned and equally spaced. If the Slotter were not employed, the splines would have to be broached. This would involve the expense of a series of broaches and several operations because the splines stop at the shoulder of the adapters . . . Use of the Slotting head saves tooling expense and the entire operation is accomplished with one set-up.

Increasing Universal Mill Versatility



An unusual means of increasing the versatility of a Universal Mill is reported by Johnson & Thomas Machine Works, Los Angeles, which may prove of value to other firms engaged in grinding operations. The firm purchased a Fray Number 7-B Ram Type Universal Mill, which is normally equipped with a Type D Milling Attachment. This basic machine is used for all types of milling and grinding operations in connection with their own tooling programs, and in addition is equipped with a Type A Fray Milling Attachment for special grinding operations on a contract they hold for making broaches. These broaches are used by a prominent tool manufacturer who is filing a large Air Corps contract for tools, each of which must be broached.

The second milling attachment is mounted on a pad attached to the column, and lies in a horizontal position with respect to its shaft line. It remains in this position during the grinding operations on the broaches and cross travel of the table is controlled by a hand lever instead of the hand wheel normally used, in order to accelerate cross movement of the broaches during the grinding.

When broach grinding operations are completed and other work is scheduled for the machine, the Type A Fray Milling Attachment is swung

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All Lathe Operators!

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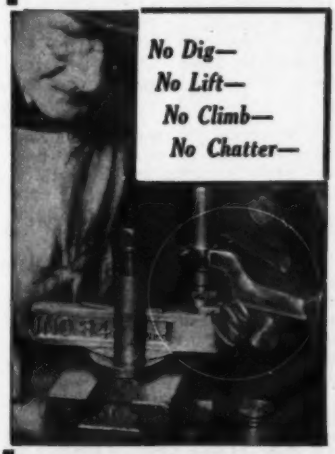
Eliminates All Chatter

Cutting-off in a lathe has always been a most difficult job, because the stock jumps, lifts, and climbs on the tool. All this is now made impossible with the Lombard Tool Holder, because it is equipped with a steady-rest that rides over the work. Holds work down. Stock can't lift. Operates smoothly, without vibration. Makes cutting-off a pleasure.

Makes Cut-off Blades Last Much Longer

—because the steady-rest supports and protects the blades against sudden lifts of the stock.



It's the New Way to Cut-off!

Different from Any Other Cut-off Tool Holder

Due to the steady-rest support, it operates perfectly and safely on power or machine cross-feed. Instead of breaking the chip, it peels off a continuous ribbon.

Operates Smooth and Steady

Stock can't lift. Different—has a shearing action. Makes any lathe cut off even smoother than most screw machines—even though the lathe bearings are pretty well shot. Makes tool cut like cheese.

GUARANTEED

to be the smoothest cut-off tool ever used, or money will be refunded.

PRICES

For 12' to 14' Lathe $14.75
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Add $2.00 for Extra Heavy Duty Model

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LOMBARD MANUFACTURING CO.
16217 Linwood Ave. Detroit, Mich.

out of position and the entire ram assembly is swung on the turret head back into normal position. Thru this arrangement, the already wide flexibility of the Fray Universal Milling Machine is greatly expanded, with a considerable saving in other tools that might otherwise be required.

Weights of Cast Rounds

H. F. Williams

From the designing board to the finished product, in many instances, the weights of the various components of a machine or mechanism must be known. From handbooks, the weight per inch or foot can be found for round steel or brass bar stock, but when it comes to other metals such as cast iron, brass or aluminum and sometimes lead, especially when castings are involved, such figures are not available.

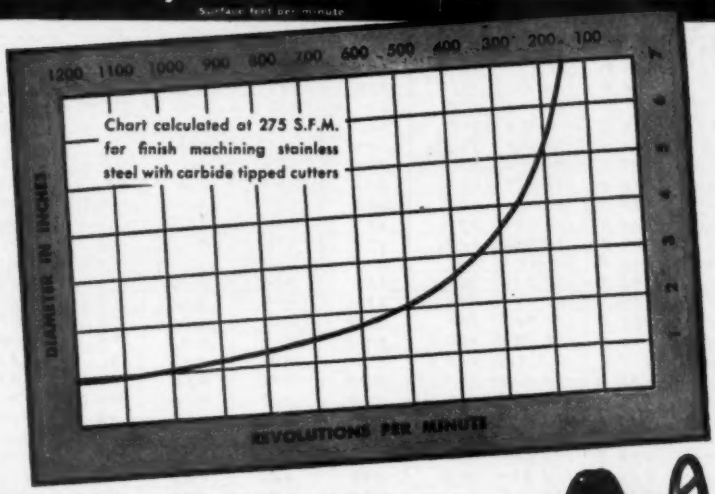
The accompanying tables have been a great time saver for both the estimating department and foundry office when calculating casting weights from blueprinted detail drawings. These tables are arranged so that the weights of rounds made of cast iron, wrought iron and steel, common yellow brass, bronze, aluminum and lead can be read directly for lengths of 1" long. Diameters from 1 to 100", advancing by ¼" increments are listed. Areas and circumferences of these circles are also given.

If, for example, the weight of a disk of cast iron is to be calculated whose size is 16½" diameter and 2¼" thick, the figure 55.5 lbs opposite 16½ in the cast iron column is simply multiplied by 2¼ giving 124⅞ lbs.

If the weight of a cast iron pulley is required, having a webbed center instead of spokes and a cored hub, it is broken down into circular components after the desired finish has been added to the various surfaces The weight of a disk equivalent to the inside diameter of the flange is subtracted from the weight of the outside diameter of the pulley and multiplied by the face of the pulley. The hub with the cored hole is figured likewise. The web is a cored disk comprising the metal between the hub and the

Diameter	Area Sq. In.	Circumference	Weight In Pounds Per One Inch Of Length					
			Cast Iron	Wrought Iron & Steel	Common Yellow Brass 60% Copper	Bronze	Aluminum	Lead
26	530.93	81.6814	138	149.2	160	170	49.2	218
26 1/4	541.19	82.4668	140.8	152.2	163.5	173	50.2	222.5
26 1/2	551.55	83.2522	143.2	154.5	166	176	50.4	226
26 3/4	562.00	84.0376	146	157.8	169.5	179.5	52	231
27	572.56	84.8230	149	161.	173	183.2	53	235.5
27 1/4	583.21	85.6084	151.5	164.	176	186.5	54	238
27 1/2	593.96	86.3938	154.2	166.5	178.7	189.5	54.8	243.5
27 3/4	604.81	87.1792	157.2	170	182	193	56	248
28	615.75	87.9646	160	173	185.7	197	57	253
28 1/4	626.80	88.7500	163	176	189	200.5	57.5	257.5
28 1/2	637.94	89.5354	166	179.5	192.5	204	59.2	262.5
28 3/4	649.18	90.3208	168.5	182	195.5	207.5	60	266
29	660.52	91.1062	172	186	199.5	211.5	61.3	272
29 1/4	671.96	91.8916	174.5	188.5	202.5	215	62.2	276
29 1/2	683.49	92.6770	177.8	192	206.5	219	63.3	281
29 3/4	695.13	93.4624	180.5	195	209.5	222	64.3	285
30	706.86	94.2478	183.8	199	213.5	226	65.4	287.5
30 1/4	718.69	95.0332	187	202	217	230	66.6	295.5
30 1/2	730.62	95.8186	190	205.5	221	234	67.7	300
30 3/4	742.64	96.6040	193	208.5	224	237.5	68.7	305
31	754.77	97.3894	196	212	227.5	241	69.7	310
31 1/4	766.99	98.1748	199	215	231	245	70.8	315
31 1/2	779.31	98.9602	202.3	218.5	235	249	71.8	320
31 3/4	791.73	99.7456	206	223	239	253.5	72.4	325.5
32	804.25	100.5310	209	226	243	257	74.4	330
32 1/4	816.86	101.316	212	229	246	261	75.5	335
32 1/2	829.58	102.102	216	231.7	251	266	77	341.5
32 3/4	842.39	102.887	219	237	254	269.5	78	346
33	855.30	103.673	222	240	257.5	273	79	351
33 1/4	868.31	104.458	226	244.5	262.5	278	80.5	357
33 1/2	881.41	105.243	229	247.5	265.5	282	81.5	362
33 3/4	894.62	106.029	232.5	250.7	270	296	82.8	368
34	907.92	106.814	236	255	274	290.5	84	373
34 1/4	921.32	107.600	239.5	259	278	295	85.3	379
34 1/2	934.82	108.385	243	263	282	299	86.5	384
34 3/4	948.42	109.170	246.5	266.5	287	304	87.8	390
35	962.11	109.956	250	270.5	290	307.5	89	395.5
35 1/4	975.91	110.741	254	274.5	295	313	90.5	402
35 1/2	989.80	111.527	257.5	278	299	317	91.7	407
35 3/4	1003.8	112.312	261	282	303	321	93	413
36	1017.9	113.097	264.5	286	307	325.5	94.2	418
36 1/4	1032.1	113.883	268.2	290	311	330	95.5	424
36 1/2	1046.3	114.668	272	294	315.5	335	96.8	430
36 3/4	1060.7	115.454	275.8	297.5	320	339	98	436
37	1075.2	116.239	279.5	302	324	344	99.5	443
37 1/4	1089.8	117.024	283.5	306	329	349	100.7	448
37 1/2	1104.5	117.810	287.5	310.5	333.5	354	102.5	454
37 3/4	1119.2	118.596	291.5	315	338	359	103.7	461
38	1134.1	119.381	295	319	342	363	105	467
38 1/4	1149.1	120.166	299	322	347	368	106.5	473

Cutting Quiz: How many S.F.M. for Stainless Steel?



Surface speeds for machining stainless steel with carbide tools can be from 2½ to 3 times faster than with high speed steel. This means *MORE R.P.M.* from old equipment for high output.

Given Vari-Speed Drives provide 30% more r.p.m. in the top bracket without sacrifice in the low! Installation of Given Vari-Speed Drives on otherwise obsolete machine tools brings these important benefits: (1) More speeds in the high range; (2) more efficient production with carbide tools; (3) instant and infinitely variable speed control without stopping the machine; (4) independent individual motor drive.

The Given Vari-Speed Drive gets MORE PRODUCTION from the same tools! No belt changing. No gears. No vibration. No danger. A bracket for every machine. 1 to 10 h.p. Low cost. Prompt shipment.

Ask for bulletin and installation blueprints.

MODERNIZE THE GIVEN WAY

Given VARI-SPEED DRIVE

GIVEN MACHINERY COMPANY • 3857 SANTA FE AVE., LOS ANGELES, CALIF.

SHEET #4

Diameter	Area Sq. In.	Circumference	Weight In Pounds Per One Inch Of Length					
			Cast Iron	Wrought Iron & Steel	Common Yellow Brass 60% Copper	Bronze	Aluminum	Lead
38 1/2	1164.2	120.951	303	328	352	373	108	478
38 3/4	1179.3	121.737	307	332	357	378	109.5	485
39	1194.6	122.522	311	336	361	382	111	492
39 1/8	1210.0	123.308	315	341	366	388	112.5	497
39 1/2	1225.4	124.093	319	345	370	393	113.5	504
39 3/4	1241.0	124.878	323	349	375	398	115	511
40	1256.6	125.664	327	354	380	403	116.5	517
40 1/4	1272.4	126.449	331	358	384	408	118	523
40 1/2	1288.2	127.235	335	362	389	412	119.5	529
40 3/4	1304.2	128.020	339	367	394	417	121	536
41	1320.3	128.805	343	371	398	422	122	542
41 1/8	1336.4	129.591	347	375	403	427	123.5	548
41 1/2	1352.7	130.376	351.5	380	408	433	125	555
41 3/4	1369.0	131.161	356	385	414	438	127	562
42	1385.4	131.947	360	389	418	443	128	569
42 1/4	1402.0	132.732	364.5	394	424	448	130	576
42 1/2	1418.6	133.518	368.5	398	428	453	131	582
42 3/4	1435.4	134.303	372.5	403	433	458	132.5	588
43	1452.2	135.088	377.5	408	437	464	134.5	597
43 1/4	1469.1	135.874	382	413	443	470	136	604
43 1/2	1486.2	136.659	386	418	448	475	137.5	610
43 3/4	1503.3	137.445	391	423	454	482	139.5	618
44	1520.5	138.230	396	428	460	487	141	627
44 1/8	1537.9	139.015	400	433	464	492	142.5	632
44 1/2	1555.3	139.801	405	438	470	498	144.5	640
44 3/8	1572.8	140.586	410	444	476	505	146	648
45	1590.4	141.372	414	448	481	510	147.5	655
45 1/4	1608.2	142.157	418	453	485	516	149	661
45 1/2	1626.0	142.942	423	458	491	521	150.5	668
45 3/4	1643.9	143.728	428	463	497	527	152.5	677
46	1661.9	144.513	433	468	503	533	154	684
46 1/8	1680.0	145.299	437.5	473	508	538	155.5	691
46 1/2	1698.2	146.084	442	477	513	544	157.5	698
46 3/4	1716.5	146.869	446	482	517	548	159.5	705
47	1734.9	147.655	451	488	523	555	160.5	712
47 1/8	1753.5	148.440	456	493	529	561	162	720
47 1/2	1772.1	149.226	461	498	535	567	164	728
47 3/4	1790.8	150.011	466	504	541	573	166	736
48	1809.6	150.796	471	509	546	579	167.5	744
48 1/8	1828.5	151.582	476	514	552	585	169.5	752
48 1/2	1847.5	152.367	481	520	558	592	171	760
48 3/4	1866.5	153.153	486	525	564	597	173	768
49	1885.7	153.938	491	531	570	604	174.5	775
49 1/8	1905.0	174.723	496	536	575	610	176.5	783
49 1/2	1924.4	155.509	501	541	582	616	178	791
49 3/4	1943.9	156.294	506	546	588	622	180	800
50	1963.5	157.080	511	552	593	628	182	807
50 1/8	1983.2	157.865	516	558	599	634	183.5	815
50 1/2	2003.0	158.650	521	563	605	641	185.5	823
50 3/4	2022.8	159.436	526	568	610	647	187	830

LESS SET-UP TIME

MEANS MORE *Production* FROM EVERY GRINDER

With the Robbins Magna-Sine your set-up time on either single or compound angular grinding jobs can be reduced from hours to minutes. When this saving in time is multiplied by the number of jobs on each grinder, the result means a considerable increase in the productive capacity of your grinding department.

Equally as important as the time saving feature of the Magna-Sine is its absolute accuracy. The Magna-Sine uses the gage block method of determining angles, and the precision construction of the Magna-Sine makes the angle just as accurate as the standard gage block that is used.

A Magna-Sine should be available for every grinder on which an average volume of angular grinding work is done. It is available in two sizes in both compound and single angle models.

Write for complete information today.

The Magna-Sine is also available in a non-magnetic model for the accurate inspection of angular machining work. The non-magnetic model is built on the same principle and to the same close limits as the magnetic model.

The MAGNA-SINE

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE • DETROIT, MICHIGAN

inside diameter of the flange. These figures are then totaled.

The tables are equally efficient for work larger then 100" diameter, weights being found by these equations:

For diameters from 101 to 200", weights will be

$$\frac{\text{Given diameter}}{2} = \text{Weight from table} \times 4$$

For diameters from 201 to 300", weights will be

$$\frac{\text{Given diameter}}{3} = \text{Weight from table} \times 9$$

For diameters from 301 to 400", weights will be

$$\frac{\text{Given diameter}}{4} = \text{Weight from table} \times 16$$

For example, the weight of a flat aluminum disk 123" diameter 2" thick is found in this manner:

$\frac{123}{2}$ 61½ From table, weight for 61½=275 lbs.
275 x 4=1100 lbs.
1100 x 2" thick=2200 lbs.

The figures in the table for diameters greater than 16" are correct to one place beyond the decimal point. The weights are based on these weights per cubic inch:

Cast iron .260 lbs
Wrought iron and steel .282 lbs
Yellow brass .302 lbs
Bronze .320 lbs
Aluminum .092 lbs
Lead .411 lbs

(Editorial Note—Two of the tables appeared in the August issue—pages 194-6. Additional tables are given in this, and succeeding issues. Save them for your engineering data file.)

The Use of Gage Blocks

When one comes down to a careful consideration of the fact that gage blocks as furnished by specialists in their manufacture are made accurate, not to thousandths as in ordinary machine shop work, not to ten-thousandths as in the case of ballbearings and other work demanding very close tolerances, but literally accurate to tolerances of a few millionths, he will

be more likely to give them the consideration and care they so richly deserve. It is one thing to obtain a set of high-precision blocks, and it is another thing to keep them in good condition. Yet where proper attention is bestowed, they may be used for many years without losing their accuracy in any degree worthy of mention.

Guard your blocks carefully against any form of use that will result in undue wear. Some get into the habit of slipping a block into and out of a slot 2, 3 or 4 times while coming to a decision as to whether it is sufficiently accurate. This is really unnecessary. The first application tells the story just as fully as 4 or 5 tries. Above everything, be sure that both the block being used and the slot being checked are perfectly clean. Use either a chamois or a piece of soft clean paper, such as toilet tissue, for cleaning the work and the blocks. Some use both, first the chamois and then the paper. Do not use cloth or fabric of any kind, for this will leave lint behind it in some degree, which will impair the accuracy of the test.

As for swiveling gage blocks in slots and notches, or sliding them back and forth in a slot, it should be self-evident that such practices will surely impair the accuracy of the blocks, and should not be tolerated. Remember that the amount by which any individual gage block departs from its accuracy thru wear is not the whole story. Where several blocks are wrung together to obtain some needed combination measurement, the error will add up to the total of that present in all of the blocks being used in the combination.

One outstanding maker of gage blocks and other devices for the maintenance of very close accuracy, in addition to providing an excellent set of blocks, accurate to 8-millionths, also manufacturers some excellent inspection laboratory tools which are particularly valuable for making a periodical check-up on the blocks to determine what amount of wear has taken place in the gage blocks over given periods of time. Such instruments include projectors, optical parallels, a so-called "comparitol," and binocular

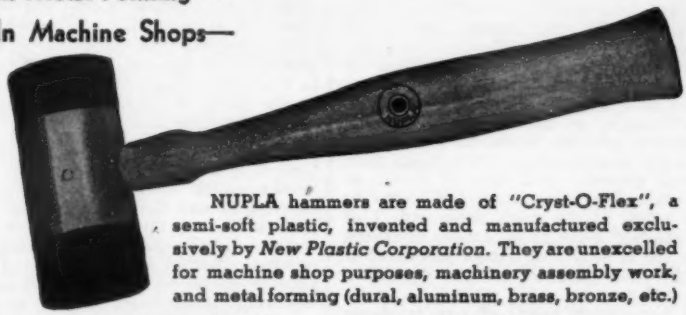
NUPLA PLASTIC HAMMERS

SAVE TIME AND MONEY

In Machinery Assembling—

In Metal Forming—

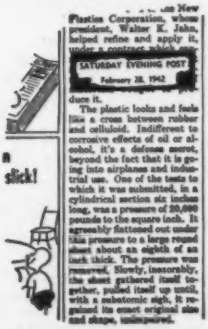
In Machine Shops—



NUPLA hammers are made of "Cryst-O-Flex", a semi-soft plastic, invented and manufactured exclusively by *New Plastic Corporation*. They are unexcelled for machine shop purposes, machinery assembly work, and metal forming (dural, aluminum, brass, bronze, etc.)

FIVE BIG ADVANTAGES

1. **NUPLA HAMMERS neither mar nor cut metal or other materials.**
2. **NUPLA HAMMERS prevent "pile up" of materials.**
3. **NUPLA HAMMERS do not sting or vibrate in heavy use, thereby reducing fatigue to a minimum.**
4. **NUPLA HAMMERS have exceptional durability.**
5. **NUPLA HAMMERS are not affected by gasoline, oil, etc.**



TWO HARDNESS GRADES:

Grade A—General Machine Shop Use.

Grade B—Hardened Cryst-O-Flex for Metal Forming.

SIZES	*WEIGHTS*
1-7/8"	15 oz.
1-7/8"	24 oz.
1-7/8"	2 lbs.
1-3/8"	8 oz.
1-3/8"	17 oz.
1 "	5 oz.
1 "	8 oz.

NEW PLASTIC Corporation

1017 No. Sycamore Ave., *Hi. 8208* Los Angeles, Calif.

microscope providing 3-dimensional vision.

Be sure to keep your gage blocks out of the vicinity of grinding machines or other locations where abrasive dust may settle upon them, or upon the work to be tested. You will appreciate that where such high accuracy is involved, a moderate amount of abrasive dust can soon work havoc. Some make gage blocks that are even more accurate than the ones already mentioned, and they make a difference in tolerances between gage blocks used as working sets and inspection sets. Those used on the job are made accurate to 8-millionths as before noted, but inspection sets are made to a tolerance of only 4-millionths. The same firm which provides both sets of blocks as mentioned, is also known to cater to the needs of the small shop with 1 or 2 standard tests to be made, involving the use of only 2 or 3 gage blocks. For such, individual blocks are furnished on order.

I have even heard of one producer of gage blocks who claims that some of his blocks are available which are accurate within 2 millionths. It is difficult to conceive of such accuracy, and it is also true that there will be few cases where such a high degree of precision is needed, but it is interesting to remember that it may be obtained if and when it is wanted.

It will pay users to remember the proposition of corrosion as it applies to gage blocks. Acid conditions of any type are likely to cause corrosion or rust. It has happened in different shops. In any place where acid is used directly as such, gage blocks must of course be kept far removed from such operations. Even in the case of rather mild acid fumes, as where acid is used for a flux in soldering operations, care must be used about having gage blocks where they will be exposed. Finally, with reference to acid, many do not realize that human perspiration has an acid content, but it is true. When putting gage blocks away, wipe them perfectly clean with soft paper, and avoid touching them with the bare fingers. Otherwise, you may be surprised to find your finger marks upon them in the form of light rust or corrosion when you take them out again.

It should be remembered, however, that it is now possible to obtain gage blocks which have been plated with chromium, and that such are less subject to the ravages of wear or corrosion. I have wondered, in this connection, whether the chromium plating process would not be very valuable for restoring worn gage blocks to their original dimensions, together with the proper grinding and lapping facilities. It is my understanding that chromium has been used in this way for restoration of worn dies. It would seem to be equally applicable to gage block restoration.

The manufacturer of gage blocks providing a set accurate to 8-millionths, and also the inspection laboratory instrument cited, is George Scherr Co., Inc., 122 Lafayette Ave., New York City.

The firm making working sets of gage blocks accurate to 8-millionths, and inspection sets with a tolerance of only 4-millionths, who also will provide individual blocks if and as needed by industry, is Webber Gage Co., of 12905 Triskett Road, Cleveland, Ohio.

The concern producing gage blocks, in some cases accurate to 2-millionths as mentioned, is the Johansson Division of the Ford Motor Co., Dearborn, Mich.

The company furnishing gage blocks of the chromium plated type as mentioned is the Dearborn Gage Co., 22032 Beech St., Dearborn, Mich.

"THROW YOUR SCRAP INTO THE FIGHT!"

Every Ton Means 2-Tons More Steel to Jolt the Axis.

and now ---

THERE IS NO GEAR TOO SMALL TO BE FINISHED BY "SHAVING"

A one inch diameter annular gear being finished on a new Michigan 861-4B.

The new Michigan 861-4B which will accurately finish machine the minutest gear in far less time than it takes to read this advertisement.

For the past few months we have been busy telling you about the new "Michigans" on which you can shave gears up to 4 ft. in diameter.

Now we would like to introduce to you the new Michigan 861, designed for the producer of small gears—for instruments, for control mechanisms, etc.—from a maximum of four inch diameter down to as close to zero diameter as you can make a gear.

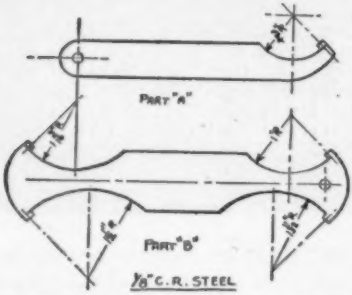
It will handle gears up to 1 inch face width and down to "nothing". The gears can be mounted on shafts up to 9 inches long or they can be annular types with no shafts at all.

Just rough them out, put them on the Michigan 861-4B crossed axis gear finisher and in a few seconds they will be finished to within tenths of a thousandth.

MICHIGAN TOOL

7171 E. McNICHOLS ROAD *Company* DETROIT, U.S.A.

Stamped Spanner Wrenches



In order to save labor and material where 4 different sizes of spanner wrenches were required, rather than to make 4 different sizes of spanner wrenches, such as shown in Part "A," it was decided to embody all 4 wrenches on one piece of material such as Part "B."

After careful consideration, it was decided to construct a die of initial low cost, short setup time, and high quality production to produce a limited number (500 in this case) of such wrenches as Part "B."

While the die in this case was of initial low cost, the semi-mass production ability compared very favorably with that of the conventional type die used in blanking and piercing of such parts. This was not only a great saver in material and labor on tool cost in producing the various wrenches, but was a very decided factor in connection with the finishing, such as heat treating, plating and packing for shipment.

(D. A. Rogers—Dayton Rogers Mfg. Co., Minneapolis).

Planer Wiring

By W. B. Wigton, Electrical Engineer

In the past it has been customary for planer purchasers to wire their machine tools permanently after these tools had been delivered and installed in their plants. Since their electricians were usually unfamiliar with the equipment, particularly with the variable voltage planer drive, considerable delay was usually encountered in getting the machines into production. In some cases this delay amounted to several weeks after the machine had been erected.

For approximately a year preceding the present conflict, the Cincinnati Planer Co., has been quoting its equipment on a permanently wired basis. Customers have appreciated the obvious advantages to be obtained and almost unanimously have specified on their orders that their machine tools be permanently wired before shipment.

The system of wiring has evolved into a standard arrangement which can be prefabricated by Cincinnati Planer electricians before the machine tool is erected on the assembly floor. All wiring is identified by metal tags, with numbers corresponding to those on the wiring diagram, so that any wiring which must be disconnected before shipment may be readily re-connected by customer's electricians when machine is installed.

As a result of this development it is now possible to place the machine tool in production almost as soon as it has been erected. The Cincinnati Planer Co. has, therefore, not only taken an interest in getting machines shipped from its own plant, but has realized that a machine tool is of no use in the war production effort unless it is actually running and producing.

Milling Machine Practice

This interesting 28-page booklet (No. M-773-1) by Hans Ernst, Research Director and Mario Martellotti, Research Engineer, The Cincinnati Milling Machine Co., is a reprint of the technical data originally appearing in Kent's Mechanical Engineer's Handbook. Additional helpful data is given on the machining of magnesium. Also, information on characteristic types of milling machines and attachments has been added. Many interesting pages are included on milling cutters and their uses. The type is large and easily read and there are numerous pertinent illustrations. Anybody interested in milling machine practice will find much valuable data in this little volume.

Above: A group of 40 mm. shell, with some of the standardized DETROIT taps and the DETROIT thread gage used for checking the threads.★

HOW "Detroit" STANDARDIZED SPECIAL TAPS for SHELL for FASTER DELIVERY

A year ago practically every manufacturer of 40 mm. shell had his own specifications for the special taps required for identical operations: threading the ends of the shell body. With a score of companies involved, Detroit Tap engineers saw that if an agreement could be reached on the design of tap for these identical operations by different manufacturers that deliveries of taps could be speeded.

After thoroughly investigating the field requirements, Detroit Tap engineers recommended two standardized designs, one for each end. ★Today already well over half of these 40 mm. shell producers are using standardized special "DETROIT" taps—now turned out by "DETROIT" on a PRODUCTION basis with greatly expedited deliveries.

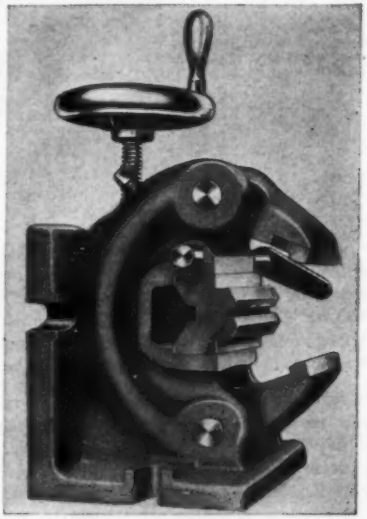
★Similar Standardized Taps for 20 mm. Shell also available

A new Detroit Tap Catalog will be off the press shortly. Shall we reserve a copy for you? Ask for Catalog 22H on your company letterhead.

DETROIT TAP & TOOL Company 8432 BUTLER DETROIT

Self-Centering Shaft Vise

The Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn., is now manufacturing a Self-Centering Shaft Vise to hold spindles or shafts for such operations as keywaying, slotting or splining. The vise is made for vertical or horizontal mounting on machine table—both bases being accurately machined at right angles. The work is held against a hardened V-block by equal movement of 2 jaws controlled from an operating screw thus centering the work for all sizes within capacity of vise.



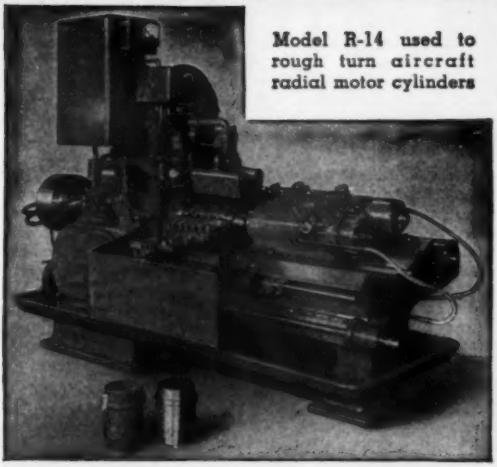
The vise will handle shafts or spindles ⅜ to 3⅛" in diameter and any necessary length. Adjustable stop for locating work lengthwise is provided.

This is claimed to be an entirely new departure in vise construction, as it insures accurate radial cuts. Manifestly, it is a type of tool that should be very useful machine in all shops.

Sizes of bases are 8x7¼" and 8x5½"; V-block is 4½" wide; Center height, vertical 5", horizontal 4⅜".

Lo-swing MODEL R-14 LATHE

A Big, Powerful Automatic for Armament, Aircraft, Truck and Tractor Work.



Model R-14 used to rough turn aircraft radial motor cylinders

The Model R-14, with its generous capacity and weight, provides the power, rigidity and tool support necessary for heavy, multiple-tool turning. It incorporates the Seneca Falls Simplified Change-Over Mechanism as a built-in feature. This mechanism makes change-over from job to job merely a matter of a few minutes adjustment. Length of carriage stroke and rapid traverse adjustment may be varied without changing any cams.

Mass, rigidity and adequate tool support to stand up under heavy cuts are inherent structural features of the Model R-14 Automatic. Positive operation, wide flexibility and servicing simplicity are important advantages accruing from its typical Lo-swing, 100% mechanical design with complete absence of clutches in the feed train. All rotating shafts are equipped with anti-friction bearings and are automatically lubricated. Carriage Ways are of wear-resisting Hardened Steel, thus assuring years of satisfactory service.

Model R-14 may be equipped with a Third Arm (overhead) as well as additional Back-Squaring Attachments, Carriages, Carriage Slides, and work handling devices. Send us your blueprints if you have a turning problem.

SENECA FALLS *Automatic* WORK DRIVE

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces —straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO. SENECA FALLS, N. Y.

Handbook on Machining Aluminum

"Machining Alcoa Aluminum" is a new edition of a 48 page standard booklet on machining issued by Aluminum Co. of America, Pittsburgh, Pa.

The booklet sets forth the general principles of machining aluminum and its alloys; suggests speeds, feeds, and depths of cut which will produce satisfactory results; points out where practices and tools common to other metals may be used; and indicates where special practices or tools are desirable. Part 1 deals with general machine shop practice. Part 2 describes the practices employed in automatic screw machine operations.

Power Press Protection

To owners who must pay the cost of compensation, and to safety engineers and supervisors, directly responsible for safety of operators, booklet by the above title, has just been announced as available by Junkin Safety Appliance Co., 10th & Hill Sts., Louisville, Ky.

There are lots of power presses operating today, thumping out tokens of America's will to win this war. With many operators comparatively new and inexperienced, value of safety measures cannot be overestimated. It makes issuance of this book timely, and its 10 pages of press safety and maintenance information a definite contribution to the conservation of manpower.

SHARP TOOLS

IN A HURRY!

LOWEST COST — WITH TOP-MOST ACCURACY AND SPEED

EXCLUSIVE, PATENTED
HILCO INDEX DIVIDING HEAD
(No other grinder has it.)
Permits fast set-up of any conceivable angle — grinds any type cutter to perfect uniformity.

Grinding 1¾ inch Slotting Saw — one of hundreds of adaptations.

★ with a ★

HILCO *Portable* GRINDER

SPEED — ECONOMY — ACCURACY ★

Keep all your cutting tools always sharp!

Keep production at top pace! Avoid "dull tool" delays and losses! Keep costs down. The HILCO Portable, Universal CUTTER-GRINDER permits you to sharpen tools in a fraction of the time required by any other type grinder. No costly set-ups—no waiting—unlimited flexibility—low initial cost, *only* **$495.00** — lowest operating cost.

So simple to operate—so compact—so easy to move anywhere on a moment's notice, the HILCO CUTTER-GRINDER is indispensable in any shop. It means sharp tools when sharp tools are needed—constantly!

Write for Catalog

BERCO MANUFACTURING CO.

423 WEST SUPERIOR ST.
Phone: SUPerior 3937
CHICAGO, ILL.

"Tooling Up" for

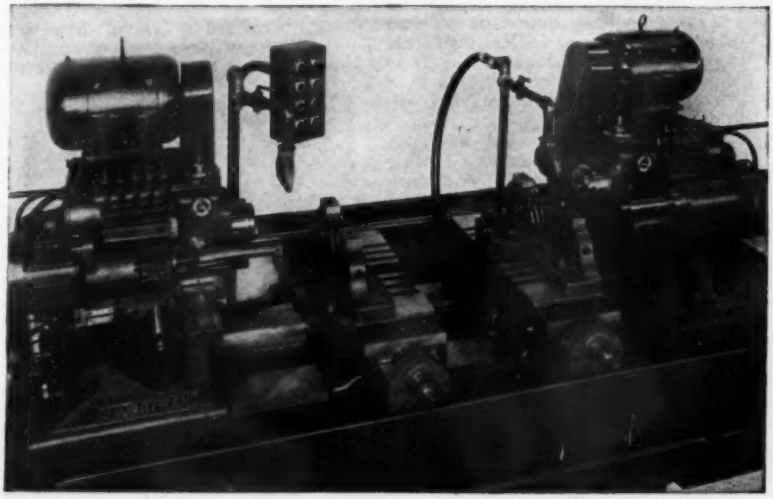
Sundstrand Double End Milling and Centering Machine

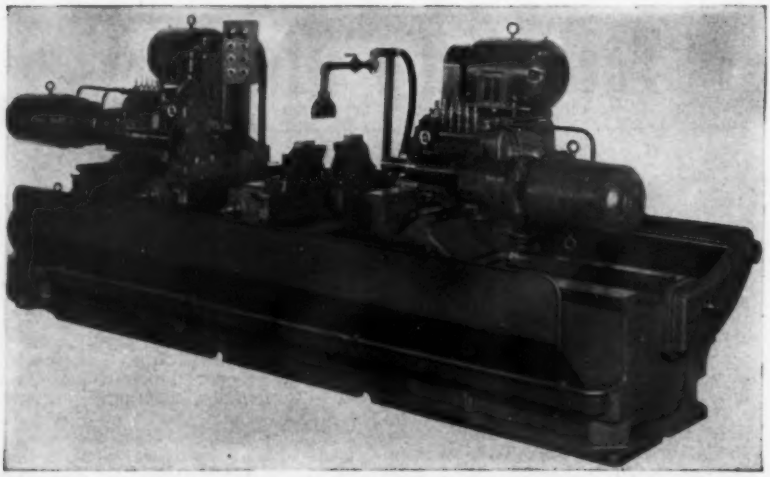
THE Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Ill., has recently put into production a new Double-End Milling and Centering Machine suitable for milling to length and centering (in one handling) both ends of shafts ranging from 1⅛ to 6" diameter by 14 to 72" long.

The machine base is a one-piece cast iron unit having horizontal ways. Crosswise to the bed ways are mounted two sub-bases. These in turn, have ways on which cross feeding heads are attached. The left hand sub-base is fixed but the right hand base is adjustable for handling various lengths of stock. Mounted to the bed ways between the 2 heads are 2 screw operated self-centering vises for holding the work. These vises also are adjustable for handling various lengths of stock. The drive to the heads is by means of a main drive shaft driven by a fluid motor. Each milling head is independently motor driven and carries a cam operated automatic centering spindle.

In a cycle of operation, the operator loads a shaft into the work holding vises. He then presses the cycle control button which starts cross feed of the heads toward front of the machine to mill both ends of the part to length.

At completion of the cross feed for milling, the heads rapidly return toward rear of the machine until the centering





spindles are in correct position and then stop. The centering spindles automaticaly travel longitudinally in a cycle of rapid approach, feed, rapid return, and stop. The cycle has then been completed and the operator unloads and reloads the work holding vises. The cycle is completely automatic so that one operator can run several machines. The parts are handled but once. Thus the milling and the centering is in a definite relation and can be very accurately controlled.

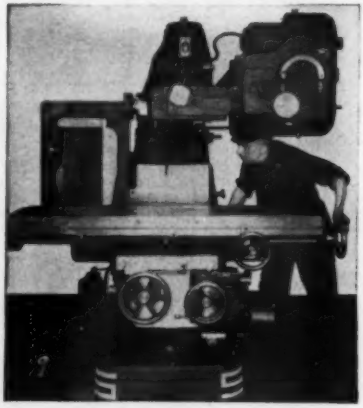
Electrically operated vises can also be provided further to simplify loading and unloading of the work. A feature of the machine is the use of Sundstrand hydraulic equipment including a tank unit, fluid motor, and valves to provide the automatic cycle for feeding the heads.

A similar type of machine can be provided for handling shafts 1 to 4" diameter by 8 to 48" long.

Shields No. 3 Vertical Universal

This versatile tool room and production machine is able to perform several varied operations, such as boring, milling and drilling on various faces of a job at one set-up. Adjustability of the milling head at any angle, also enables the machine to do the work of a standard Universal Milling Machine, such as spiral milling.

Upper part of column contains a large bore for reception of a swivel drum. Attached to swivel drum is a worm wheel of large diameter, meshing with a worm mounted on ball bearings



Information supplied by "Hitchcock's Machine Tool Blue Book"

Formerly, salvage was a matter of good plant housekeeping. Now, it is a patriotic duty.

Many excellent salvage plans are already in operation. No plant is too small to enlist in the war against waste.

A primary object is to utilize or reduce scrap. When short ends are used to make smaller pieces, the saving is equal to the difference between the costs of good and scrap materials. Where possible, reclamation of rejects offers a chance for worthwhile savings.

Careful segregation of scrap pays dividends. The junk man pays for gross weight at the unit price for the inferior metal in each lot. Solid scrap has a higher resale value than chips. Ferrous metals should be separated into groups in accordance with the strategic alloy content. Color codes are helpful in this segregation.

Short stubs of welding rod may be returned to the welding supplier for credit. Wornout or broken dies, drills, punches and tools are salvaged and used in other ways, wherever possible. Cutting tools are being re-tipped with high speed steel or other hard surfacing materials. Bearing metals are collected and in many cases recast.

inside column. Swivel is securely clamped in any position by means of a large diameter flange acting as a brake. A locking drum fits over flange and is locked by means of a single nut. To change angular direction of spindle in a longitudinal direction, locking nut is loosened and head can be swung into new position by turning worm handle which is fitted with dial showing one turn as 5°. Head is swung in goose neck by like means. Dial on this handle reads 1 turn as 10 degrees.

Electrical controls for 3 motors are all in 1 large box built especially for this machine by Cutler-Hammer, with left to right switch for spindle and red light to show when motor is running. Push button switches control all motors. All cables to and from motors are concealed. Feed motor will not start with spindle idle and will stop when spindle is stopped.

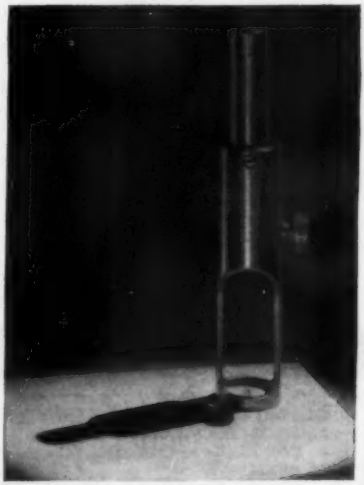
Spindle is driven by a 3 hp motor thru Reeves Variable Speed Pulley. Speed is shown by dial behind speed control wheel. Drive is either direct or thru hardened spiral gears. Back

gears and clutch are thrown in and out by a single lever; the 2 movements being connected by a link mechanism. A 4-speed sliding gear transmission is incorporated in head for spindle power feeds of .005 .007 .010 and .014" per revloution.

Spindle is of Nickel Molybdenum steel, hardened and ground, supported by duplex super precision ball bearings at the nose, with another precision ball bearing in the middle and a double row precision bearing at the end. It can be moved by hand or with power feed.

Power feeds and rapid traverse are provided in all directions with directional control. A 1-hp motor supplies power for these feeds. Rate of feed can be varied by turn of a hand wheel with rate shown by a dial behind it. All ways are protected by Neoprene wipers. Pump is mounted on outside of machine.

The Center Master



An entirely new type of locating and centering tool that is particularly effective in accurately centering layouts to spindle, is announced by the Center Master Division of the Center Scope

Instrument Co., 351 South La Brea Ave., Los Angeles, Cal.

According to the manufacturer, this new Center Master reduces the number of steps necessary in locating and centering work to spindle axis. It is said to increase accuracy because it compensates for spindle and adapter run-out, and because it is easier for the operator to center his work lines between the scribed lines on the locating glass.

It's simple in construction and operation yet extremely accurate and easy to use. Overall length is 3¼" with a ⅜" spindle shank 1" long. Has a knurled trimming screw for compensating run-out.

It is claimed that there is no parallax and that every operator, even "green" trainees, can do better, more accurate work with this patented device. It's not a delicate instrument to be kept under lock and key, but rather one to be kept on the work bench ready for instant all 'round use. Packed in a wooden box, moderately priced to the average machinist, it is suggested that it be consistently used for work locating from layouts.

Gear Chuck Speeds Work

The Cotta Speed-Chuck, originally developed and now offered by Charles Cotta, 1712 Harlem Ave., Rockford, Ill. is a practical gear manufacturer's solution to the problem of holding spur

or helical gears for hub, hole, or face grinding and other comparable operations. Loading and unloading time is reduced to a minimum because the gear is simply set into the chuck where a slight turn causes it to be gripped firmly by a set of hardened and ground pitch-line pins. These pins bear against a set of accurately ground eccentric cams which are placed to tighten against the normal direction of rotation. The gear is released by a slight turn in the opposite direction. The saving in time over ordinary chucking and alignment procedure can be appreciated.

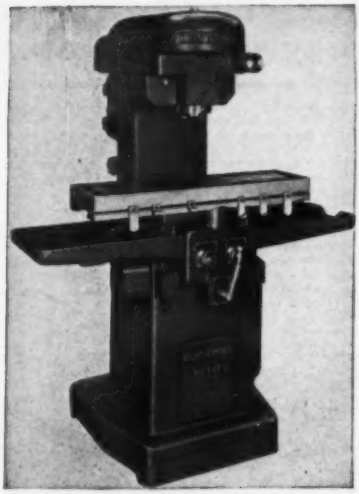
The maker emphasizes that with this chuck, alignment is automatically accurate because the pins are sized to bear at the pitch line and the cams are carefully ground to assure concentricity. Each Speed-Chuck is specially designed and built for the job on which it is to be used, which makes it primarily a tool for production jobs. Various types are available for single or cluster gears, and sizes range from 3 up to 36" diameter.

War-Time Bearing Metals

A new bulletin on bearing metals, which is particularly timely in view of war-time restrictions on tin-base babbitts is available. It describes various lead-base metals which have been found exceptionally long-wearing on shock loads, on heavy sustained pressures, and on general service; and have proved to be excellent substitutes for tin-base bearing metals. Two useful features of the bulletin are a number of practical suggestions for best results in making and maintaining journal bearings, and a table of recommendations for selecting the correct type of bearing metal for 135 different types of machinery. In addition, the bulletin also describes Isotropic Bronze Bushings, die-cast by the crystal control method which is said to produce a more homogeneous and stronger structure than that of ordinary bronze bearing stock.

Copies may be obtained by addressing Magnolia Metal Co., 18 West Jersey St., Elizabeth, N. J.

Vertical Miller



Designed for today's increasing demands for production - line methods, newly-announced No. 1-14V Vertical Milling Machine by Kent-Owens Machine Co., 968 Wall St., Toledo, O. is built especially for rapidly performing vertical milling operations on small parts.

It has a simple, infinitely adjustable hydraulic table feed with full automatic cycle. Table movements are effected by convenient control, lever indicating direction of table movement. Graduated dials, infinitely adjustable provide any feed rate within range of 1 to 40" per minute.

Table has feed and rapid traverse in both directions, automatic shift from rapid traverse to feed in either direction and automatic reverse at both ends of stroke. Hence, practically any desired cycle can be obtained, such as milling work at one end of the table while unloading and loading the other. Dogs can also be provided for intermittent milling.

A floor-type machine, the box-type bed completely encloses motor and hydraulic pump unit, for actuating table. Table rides directly in ways on bed. Both spindle head and head carriage are 1 piece castings.

Spindle head has cross adjustment by means of a screw with micrometer dial. It moves in long narrow ways in the head carriage. The head carriage is adjustable vertically on 2 ground cylindrical steel posts by a screw micrometer dial. Design is claimed to provide unusual rigidity because work and cutter are closely coupled regardless of the size of work.

Ten spindle speeds ranging from 115 to 300 rpm are quickly available. There are no gears in the spindle drive, this being entirely by V-belts from standard foot-mounted motor mounted on rear of spindle head. Interchangeable V-belt pulleys are used with intermediate adjustable pulley to provide full speed range and keep belts in proper tension. Spindle speed changes are made simply by raising hinged cover on spindle head and properly setting V-belts.

Machine can be equipped with either 1 or 2-way positive stop with dwell. With this arrangement the work is fed into the cutter to a fixed positive stop.

"He owns the only orator in the class."

Drawn for Office of War Information

Eutectic Welding Book

High temperature in oxy-acetylene and arc welding may create stresses likely to present a hazard in machined parts. Castings may become distorted. Same holds for sheetmetal welding, and particularly in machine and tool repair, and salvage operations. Changes in metallic structure, likely to be set up around welding zones, are another hazard of high-temperature welding.

Advanced as largely avoiding such weaknesses, is eutectic (low temperature) welding, specialty of Eutectic Welding Alloys, Inc., 40 Worth St., New York, who makes Castolin eutectic alloys and their autochemic fluxes, for use in oxy-acetylene, gas torch, metallic arc, carbon, induction, resistance and furnace welding.

The firm's new handbook, "Welding's Greatest Advance," is an exhaustive treatment of the subject of eutectic welding virtually from ground up to most recent developments. Sized 8½x 11", it has 36 pages filled with data and explicit, illustrated details of typical jobs and applications, which should make an important addition to files of engineering offices.

Automatic Reduced Voltage Starters

A new, 16-page bulletin describing its line of automatic reduced voltage starters is offered by Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis. It contains a complete discussion of factors that enter into selection of automatic reduced voltage starters for squirrel cage motors.

The bulletin also includes a description of Allen-Bradley Bulletins 740, 741, 742, 746, and 747 automatic resistance starters of various types and sizes. Several incorporate Bradleyunit graphite compression resistors, consisting of an insulated steel tube filled with graphite discs. Resistance of this type of resistor is changed simply by applying pressure upon the discs. Stepless adjustment of motor current is thereby obtained.

Ithaca Toolmaker's Compass

Designed to overcome the difficulties encountered in attempting to scribe small circles from a few thousandths up to ⅝" radii, a handy new compass has been developed by Ithaca Scientific Instrument Co., Ithaca, N. Y.

The center is stationary. Compass body is free to slide up and down on it, and to rotate about it. A hardened lapped bushing assures accurate slide fit of pivot needle in compass body. A convenient worm clamp nut locks worm gear after setting. A knurled nut at the top is used for setting radius. A pencil adapter gives the draftsman an improved rivet compass. Full details are given in a bulletin.

Bulletin on Dynamic Balancing

In addition to complete descriptions of the many Bear Dy-Namic Balancing Machines available for balancing armatures, fans, wheels, gears, etc., this booklet contains concise data on Dy-Namic Balancing and its importance in eliminating noise and premature wear due to excessive vibrations resulting from couple action. Booklet explains Bear Dy-Namic Balancing principles. Address Bear Mfg. Co., Industrial Div., Rock Island, Ill.

Mounted Wheel Manual

A volume which will doubtlessly be accorded a welcome in every shop library is the new manual by Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, now ready for distribution to interested parties.

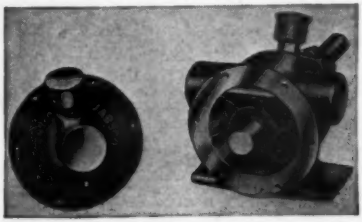
Distinction in the illustrations has been achieved thru showing the firm's products accurately (within .001") and in full colors, according to A. T. Dalton, Secretary.

Listed is a wide variety of time-saving accessories for use with portable equipment. Included are mounted wheels, steel cutters, drills, (special type) polishing wheels, small wire brushes and many other items.

The book offers for the first time in print, according to Dalton, concise and detailed information on selection and use of mounted wheels. Edited along the war pattern, many practical setups are given. Particularly of interest is the section on mounted wheels, giving comprehensive data covering the grinding of all classes of materials with mounted wheels. Applications to various war-production jobs are illustrated.

Jabsco Coolant Pump

A new type of self-priming pump with but one moving part is announced by the Jabsco Pump Co., 8302 Wilshire Blvd., Beverly Hills, Cal.



Designed to pump either thick or thin coolants, it is recommended for the handling of coolants that may have become contaminated with abrasives.

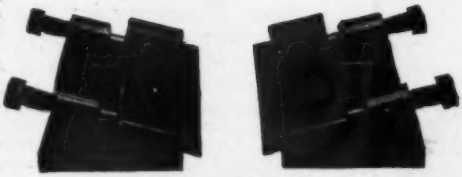
The pump is extremely simple in construction and operation — a single Neoprene synthetic rubber impeller is the only moving part. Pumping action is said to be positive and it does not require priming each time machine is started.

All parts except impeller are of bronze—there are no adjustments and no gears to clog or become noisy when worn. According to the manufacturer, a feature of the pump is that the Neoprene impeller allows a certain amount of solids to pass thru without clogging or injury, while the single moving part cuts operating costs and lengthens life of pump.

The pump is particularly adaptable to fields wherein pressure requirements are low. Mounted at any angle, it can be operated in either direction. It is available in ¼" to ¾" sizes with capacities from 2½ to 22 gpm.

A 6-gallon tank, motor and pump have been combined into one easy-to-carry portable coolant unit for use with drill presses, lathes, grinders, saws, tappers and milling machines.

"Keep 'em Flying"
Buy U. S. War Savings Bonds and Stamps



HART'S
Divided Machine Vises

These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The Jaws are tool steel and hardened, the angle holding the work down on the table.

Size of Base	**5x7 inches**
Size of Jaw	**3x6 inches**
Height at highest Point	**2¾ inches**

When writing for descriptive circular kindly mention the BLUE BOOK.

HART MACHINE CO.
26 Mather Street, - Dorchester, Boston, Mass.

HART'S
Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".

RICKERT-SHAFER

Specialists

IN THREADING TOOLS

AUTOMATIC DIE HEADS

COLLAPSIBLE TAPS

BORING HEADS

FRICTION TAPPERS

SPECIAL THREADING MACHINES

The RICKERT-SHAFER Co.
ERIE, PA.

"Save Manpower for Warpower!"

That is the theme of the 31st National Safety Congress and Exposition, to be held in Chicago Oct. 27-29. The first wartime Congress since 1918 will be devoted completely to the safety job now at hand—to help win the war.

The entire Congress program, covering every phase of safety with 175 sessions and 50 program participants, will be centered on the problem of stopping accidents that delay victory by slowing production, impeding the movement of troops and supplies, and wasting manpower, material and time.

The Congress is the annual convention of the National Safety Council. It is the largest safety event in the world. Attendance averages 10,000, and safety leaders from all parts of the country assemble to exchange ideas, experiences and problems. Delegates this year will work overtime to cram the program into 3 days, instead of the usual 5, and thus avoid week-end travel.

The 1942 Congress comes in the midst of a nationwide war emergency safety campaign being conducted by the Council at the direct request of President Roosevelt.

Headquarters for the Congress will be the Hotel Sherman in Chicago, but sessions also will be held in the Morrison and LaSalle hotels.

An exhibit of all types of safety appliances and equipment will be featured.

Stain, Tarnish and Rust Remover

Industrial Chemical Products Co., 3777 Bellevue Ave., Detroit, announces Sol-Klean for use in the metal working industries. It is claimed that this product will fill a long felt need for a safe, easy, non-corrosive material for removing stains, tarnish, rust and burned spots from tools and equipment. It also may be used to neutralize and clean soldered and welded joints.

Sol-Klean is a non-inflammable, non-toxic and non-corrosive material and may be applied with a dampened cloth or may be brushed on then wiped with a dry cloth.

Uncle Sam Needs Metallurgists

The Civil Service Commission is recruiting metallurgists under 2 new examinations recently announced: — No. 238 for positions paying $2,600 to $5,600 and No. 254 for junior grade positions paying $2,000.

Requirements of the examinations have been modified and college teaching in metallurgy is now accepted as professional experience.

For higher grade positions ($2,600 to $5,600) the requirements now are:—completion of a 4-year course with major study in metallurgy or closely allied subjects and a minimum of 2 years of professional experience (which may include college teaching) in metallurgy. Additional experience will be required for the higher grades.

For junior grade positions ($2,000) requirements are:—(1) completion of a 4-year college course in metallurgy or metallurgical engineering; or (2) completion of a 4-year course in an allied subject supplemented by (a) one year of paid experience in metallurgy (which may include college teaching), or (b) 15 semester hours in metallurgy or metallurgical engineering, or (c) 2 War Training Courses in metallurgy. Applications will be accepted from college senior or graduate students who expect to complete the required courses within 6 months after filing applications.

Announcements and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

Plastic Repairs Patterns

A plastic which for years has given strength and resiliency to box toes of shoes now speeds military production in foundries by affording quick, easy, economical repairs and alterations to patterns of metal castings.

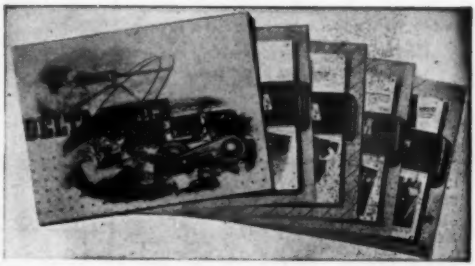
A colloid treated fabric trade-marked "Celastic," this plastic is double-napped cotton flannel, similar to a cotton blanket, impregnated with cellulose nitrate and a fire retardant making it slow-burning. Wet down with a solvent, it may be formed into any shape, and will retain that shape on drying. It has good adhesive properties, and will stick to wood, metal, and other materials.

When a wooden or metal pattern is to be repaired or altered, a piece of "Celastic" is cut to the desired size and shape. The piece may be beveled to a feather edge. It is then wetted with a solvent, and easily formed into the shape of the pattern with the fingers or a shaping tool. It has a hard, even surface on drying, and may be lightly sanded and shellacked for a smooth surface.

Patterns formerly discarded but now repaired with "Celastic" have given satisfactory service for as many as 200 castings in tests at the Worthington Pump Company in New Jersey and still remained in excellent condition.

"Celastic" will dry in 25 minutes with some solvents, but longer drying periods are recommended. The plastic may be reworked or removed entirely merely by again wetting it with a solvent.

Delta Units In War Production



Many time-saving adaptations of low-cost machines to all branches of the armament program are photographically shown and described in an unusual new booklet just published by the Delta Mfg. Co., 604-H East Vienna Ave., Milwaukee, Wis. Scores of actual shop photographs show many applications of the new type low cost Drill Presses, Grinders, Cut-Off Machines, Abrasive Finishing Machines, Circular, Scroll and Band Saws. There are numerous pictures of arsenals, aircraft plants, ship yards, foundries, training schools, ammunition factories and war production plants of all types showing special set-ups developed at low-cost; batteries of drill presses operated by women and unskilled labor; clever short cuts made possible by these flexible, adaptable machines. Any one connected with the problems of maintaining and increasing war-time production will find it well worth while to write for a copy of this graphic and practical booklet.

Speeding Spray-Gun Operations

In a profusely illustrated 15-page booklet—"How to Speed Up Your Finishing Operations." the technical staff of the Finishes Division, E. I. du Pont de Nemours & Co., Wilmington, Del., explains the 11 factors that must be properly controlled in order to attain the utmost efficiency in spray painting.

Because today manufacturers are confronted with new finishing problems as a result of conversion, and many semi-experienced spray-gun operators work on the production lines, the pocket-size booklet is expressly devised as an educational piece to help speed output, avoid rejects and wasted finishing materials.

The 11 points for efficiency and conservation described in text and illustrated by photographs and diagrams are:—Temperature of Paint; Air and Fluid Pressures; Viscosity of Paint; Adjustment of Spray Gun; Handling of Spray Gun; Triggering of the Gun; System in the Strokes; Uniformity of Coating; Thickness of Film; Causes of Rejects; Touch-Up Procedure.

"Only 39 cents for all this metal! Why, where's your patriotism?"

Employees Win Awards

More than $63,000 has been paid since January 1 to employees of the General Electric Co., as a whole for suggestions adopted to speed war production, according to General Sup't B. G. Tang.

During this period, 7500 of approximately 25,000 submitted suggestions were adopted by the Company, Mr. Tang revealed.

Among recent outstanding employee suggestions was one relating to an improvement in a particular type transmitter part, several of which are used in highly complex aviation equipment. This suggestion earned $350 for its originator, Miss Laura Garrison, who instructs new employees in a G-E plant.

Another suggestion was an improvement in assembling radio equipment for the Army and Navy. This suggestion was offered by John Vos, employed in a G-E radio testing department, who was awarded $40.

Making Quartz Flats

Optical flats of quartz have come into increasing preference, due to specific advantages of the latter over glass. Even should the quartz flat receive a scratch, it will not materially affect its efficiency. Scratches on quartz do not give rise to ridges, as is the case with glass. Where one scratch would probably render a glass flat useless; one of quartz can have so many scratches as to be almost opaque, and still render good service, says Industrial Diamond Review, London.

In making quartz flats, great skill is needed. Accuracy has to be within 2 millionths of an inch! Final polishing operations are performed by hand, and are produced with an accuracy for parallelism and flatness of .00002 and .00001", respectively, with a working tolerance of .0003" allowed for thickness.

Interesting methods are applied in manufacture. Pyramidal ends are removed from the big quartz crystals by iron sawing discs, impregnated with diamond dust. Then the sawn surfaces are ground square with the optical axis of the crystal. Usually the crystals must be cut on both ends, ground and polished, to permit internal inspection for defects.

Longitudinal and transverse resawing provides the rough blocks. These are ground on both sides on horizontal grinding wheels. Then the cylindrical edge is ground to shape. Edges are not polished, specially. Polishing of flat sides consists of a series of lapping operations. The number depends on degree of finish desired. Cast-iron lapping discs with different degrees of abrasives are used in these operations. Flats are held in position by partial embedding in pitch, with upper faces clear. Each face requires about 8

hours of lapping. When reversed on its table, this already-finished surface serves as datum for determining thickness and parallelism, to the 2-millionth inch accuracy previously mentioned.

Accurate control of thickness is not always obtained on the machines, requiring hand-finishing, a highly skilled process. In this operation, an accurately flat steel disc is warmed and moved by hand over the stationary pitch table. The steel discs are trued themselves on the lapping machines used for the flats. Treated pitch surfaces are trued at frequent intervals with a smooth and level steel disc.

In employing the flats in checking micrometers and for other purposes, the principle of Newton's rings is used. Each interference-band indicates an air space between the contacting surfaces of thickness equal to ½ a wave-length of light, i.e., of the order of .00001".

Buy U. S. War Savings Bonds and Stamps

Air Tools

Air turbine tools are popular and the application of the air turbines to some types of rotary tools is very important. For this is the one kind of air tool that may be run safely without load, depending upon the propulsive force of compresed air against rotor blades to obtain the necessary rotary motion. Very high speeds may be obtained in this way, and many machine designers who have used air turbines declare them to be superior to anything else for certain applications.

In general, the air turbine is chiefly applied to small hoists, and to highspeed drills and grinders. However, it is very interesting to note that it has found considerable application to high speed woodworking machinery which takes only a light cut at the spindle, such as light-duty high-speed wood shapers and routers.

Users of air turbine motors generally design and build their own for the products to which they are applied. Size of the turbine rotor, and the pressure of the compressed air used, are the 2 factors which determine speed. One can adjust speed without regard to the first, simply by lowering pressure or by decreasing amount of air thru a valve, but when this is done, power of the motor is decreased in proportion.

As for lubrication of rotors, bearings of air turbine motors are often oiled by hand, but if there are enclosed gears involved in a mechanism to which it is applied, they are of course bath-oiled for best results.

Use of air turbine driven tools has received great impetus in the war-production speed-up, with hardly a shop, where several of these efficiency aids cannot be found.

Hammond 20-S Wet Grinder

A newly designed 20" Wet Tool Grinder is announced by Hammond Machinery Builders, Inc., 1614 Douglas Avenue, Kalamazoo, Mich.

Known as the 20-S, it is said to incorporate in its heavy, streamlined construction all the latest improvements for grinding of all hard metals, alloys and tungstein carbide.

The standard machine illustrated features a new, improved tool rest and wheel dresser. Tool rest is adjustable to any desired angle and has replaceable steel wearing plate. Wheel dresser, an integral part of the assembly, affords an easy method of dressing face of grinding wheel. The entire unit adjusts in and out from wheel by means of a detachable hand crank, which actuates a protected screw mechanism. Circulating coolant system with convenient regulating valve located in sludge pan to the right of tool rest, provides regulation of coolant flow. The detachable splash guard (as shown in phantom across front of the newly

designed sludge pan) provides added protection to the operator.

The 3 hp totally enclosed fan-cooled motor is located in the base with a push-button starter high at side of machine. Starter is of the magnetic type with overload, low voltage and phase failure protection.

Grinding wheel furnished is 20" in diameter x 2½" face with a 9" hole for mounting on a large hole wheel flange. The heavy cast wheel hood has hinged cover. Removing 2 Allen cap screws, the hinged cover swings out of the way giving accessibility to the wheel. Wheel is dismounted by mere removal of a nut and 4 Allen cap screws.

For a heavy duty, high production carbide tool grinding, the modern design of the 20-S permits use of an 8"x8" table with tilting mechanism (optional equipment). The table tilts on hardened pivot pins with oilite bronze bushings by merely flipping convenient locking levers on sides. The entire table assembly moves in and out from grinding wheel face by means of a detachable hand crank actuating a protected screw mechanism.

Bulletin No. GP-101 gives complete information.

Standard Seam Welder Bulletin

Technical and descriptive Bulletin 801-B . . . covering its new line of standardized Seam Welders, has been released by Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich. The bulletin covers design and operating features of light, medium, and heavy duty seam welders which are available in 3 styles—for transverse welding, for longitudinal welding, and for both types (Universal models).

Diagrams of the 3 types of drives available for these machines, as well as illustrations of typical applications are included. Specifications tables and drawings showing major dimensions of the standardized machines are provided.

Elmes Hydraulic Pump

Illustration shows a 6-plunger, fully enclosed, horizontal, hydraulic pump—an addition to a broad line manufactured by the Charles F. Elmes Engineering Works, 244 N. Morgan St., Chicago.

The pump is modern in appearance and embodies the latest principals of design and construction. Moving parts are pressure lubricated and the connecting rods run in a continuous bath of oil. Roller bearings are used thruout.

Maximum capacity is 400 hp. Herringbone Gears, running in continuous bath of oil, are used for driving the pump, insuring long gear life. Compact arrangement of the pump is a space saver, and it is particularly adaptable for accumulator systems.

Can be equipped with built-in bypass valves or safety valves, as desired. Complete data is available from the firm.

LIKE A DUCK TO WATER

WOMEN and unskilled operators take to these machines

And here's the proof: Reports from shop superintendents and managers in plants *(names on request)* using Delta Drill Presses, Grinders, Saws and Cut-Off Machines read: "... unskilled operators can be used successfully due to the accuracy and perfect balance of Delta machines." "... with Standard Delta Drill Presses we have built a special machine that enables us to use unskilled labor on an extremely difficult operation—thus freeing skilled mechanics for more difficult work." "... the training time and breaking in period have been considerably reduced with Delta machines thus permitting us to take better advantage of unskilled labor."

Delta Design Always Offers These Advantages:

Low First Cost • Low Maintenance Cost • Economical Operations • Reduced Labor Costs • Greater Flexibility • Portability

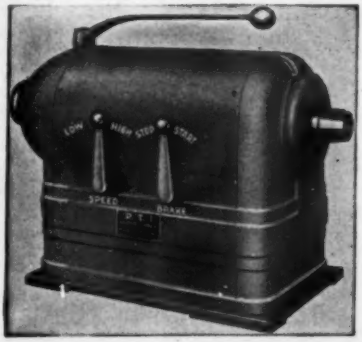
The complete DELTA-Milwaukee line consists of low-cost, high-quality Drill Presses, Cut-Off Machines, Grinders, Abrasive Finishing Machines, Saws, Lathes, Jointers and Shapers.

SEND FOR FREE "TOOLING TIPS"

showing how other manufacturers are taking advantage of DELTA machines. Get in touch with the nearest DELTA Industrial Distributor or write direct to The Delta Mfg. Co., 604-L E. Vienna Ave., Milwaukee, Wis.

Colborne Speed Lathe

These days find many needs for speeding up final operations on dies, screws, shafts and long rods. Built to meet these needs, embodying experience of nearly ¾ of a century of machine manufacture, this speed lathe, by Colborne Mfg. Co., 157 W. Division St., Chicago, is claimed to afford the smooth-running, heavy, quality construction demanded in such a production adjunct.



It is designed for efficient, economical lapping in miscellaneous finishing operations, with collets or chuck, and powered by 1 hp built-in motor with variable speed control, using Reeves standard pulley and belt.

Smooth, automatic brake acts instantly when switch is thrown.

The firm has printed literature available, giving full details to interested plant executives.

Portman 20" Screen Optical Comparator

Portman Machine Tool Co., Beechwood and Hillside Ave., Mount Vernon, N. Y., announces a new larger sized Optical Comparator.

Known as the Portman Model P222, it offers several features not heretofore regularly obtained in equipment of this kind. The large 20" diameter image screen makes it possible for this comparator to project an unusually large area.

The fine quality lens units furnished are said to provide a sharply defined outline of the part over the entire 20" diameter screen area. Equipment includes a co-ordinate type stage, dial indicators for taking continuous readings, surface illuminators for projecting the surface characteristics of a part, and a blower system attached to the light source assembly enclosing the condenser lens unit. In addition, the light beam is filtered thru a colored heat absorbing glass unit within the condenser lens, providing a soft light

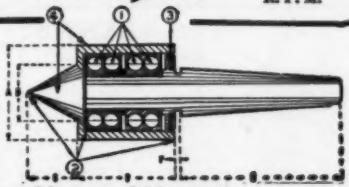
of great clarity over the entire screen. The comparator can be furnished

QUADRO *PRECISION* LIVB CENTBRS

5 REASONS *Why They Meet Every Specification:*

1. FOUR (4) ROWS of precision BEC-4 specification bearings.
2. Note SHORT OVERHANG assuring rigidity and accuracy—eliminates "chatter"
3. Positive FELT-SEAL—excludes dirt—retains lubrication.
4. HARDENED AND GROUND CONE—point accurate to within .0002.
5. HEAVY DUTY—Note Combined Radial Thrust Load at 100 R. P. M.

Morse No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1¾	⅞	¾	1 15/16	2⅞	1600	$23.00
3	1¾	⅞	¾	1 15/16	2 5/16	3300	$25.00
4	2 1/16	15/16	15/16	1 15/16	4⅝	7500	$35.00
5	2 9/16	1 3/16	1	2 9/16	5 9/16	12000	$47.00



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Shear Cut End Mills are offered in all standard sizes, single and double end.

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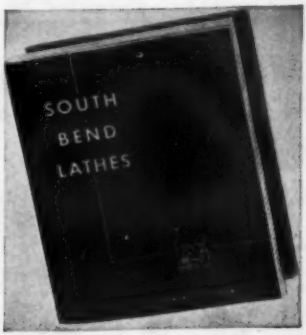
with lens units of the following magnifications: — 10X, 20X, 30X, 31¼X, 45X, 50X, 60X, 62½X, 80V, and 100V. 45V, 50V, 60X, 62½X, 80X and 100X. The principal dimensions are:—Height 58"; width 26"; depth 36", and the weight is approximately 400 pounds. The light source will operate on 110 to 120 volts, a-c or d-c. Critical inspection and comparison can be made on this instrument, even in the hands of inexperienced operators.

South Bend Catalog

A new catalog describing the entire line of South Bend Engine Lathes, Toolroom Lathes, and Turret Lathes Catalog 100 has just been published by the company. Engine Lathes and Toolroom Lathes are made in 3 sizes, having 9, 10 and 16" swings. The new catalog has 48 pages, 8½" x 11", and can conveniently be filed in letter size catalog files.



Each size and type of lathe is illustrated and fully described, with specifications tabulated to facilitate selection of the lathe required for any desired application. Attachments, tools, and accessories for adapting these lathes to special classes of work are also illustrated and described.

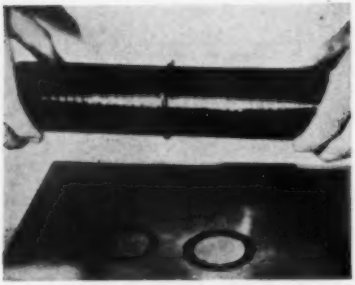
Catalog No. 100-B can be obtained from the South Bend Lathe Works, Dept. M6, South Bend, Ind.

Shapers

When you have a shaper with a really good universal table, you have a highly versatile machine, and one that by the same token is highly useful. One of the weaknesses of some universal tables has been their lack of rigidity, but machine designers are getting to the point where much of this trouble has been eliminated. In the case of one highly efficient shaper having a universal table, the table mounting revolves laterally around a large trunnion which has been cast integrally with the apron. Once it has been properly positioned and tightened into place, this gives one of the most rigid layouts possible. Table is fitted with top that rocks in direction at right angles to pivoting action on trunnion, and rocking mechanism is so arranged that table top keeps a solid bearing in table body, regardless of position at which placed.

Many shapers which had formerly given questionable production have been brought up to par by the simple expedient of applying a good motor drive. This is especially true where an old machine in reasonably good condition has been fitted out with modern carbide tooling, and in consequence demands a higher operating speed in order to give proper results from that tooling. If you install a really efficient motor drive on such a machine, it can be arranged at speed which will produce best results from the better tools. It is, of course, in order to go over such a machine and take out any unnecessary lost motion or other operating defects that may be discovered.

Saran Plastic Pipe



A new plastic pipe, manufactured in the same dimensions as extra strong steel pipe of 2" OD or less, is announced by The Dow Chemical Co.

Resistance of this pipe to extreme moisture, chemicals and solvents, coupled with its strength and fatigue life, indicate it will play a vital role in industry. It is entirely unaffected by water—and only a few solvents exhibit any adverse effects. In many applications it will undoubtedly replace strategic materials, such as vital metals and rubber.

It is made of a new thermo-plastic resin known as Saran. The base resin is odorless, tasteless and nontoxic. The plastic does not burn and its toughness and abrasion resistance are of a high order. Retention of these properties on aging insures excellent wearing qualities. It is nonscaling and withstands freezing. Heat resistance is said to be excellent up to 175 F.

Saran pipe is produced in smooth, round, accurately sized lengths having dimensions identical with those of strong iron pipe. It can be readily welded, heated and bent. In welding, pieces are placed on a hot plate heated to 350-400 F and held until molten material appears. Pieces are then placed together in proper position, pressed firmly and allowed to cool for 10 seconds, as shown in illustration. Resultant weld has greater joint strength than the pipe itself. Can be cut with

a wood or hack saw and threaded with ordinary iron pipe dies.

In demonstrating threading of larger plastic pipe sizes, Dow engineers advise inserting a close fitting plug within the end to be threaded to guard against compression of the pipe and resultant shallow threads. This precaution is not absolutely essential providing sharp dies are used.

Weight of the pipe is naturally much less than comparable sizes of iron pipe. This, too, is a decided advantage in shipping, general handling and suspension. Tabular data concerning sizes, weights and bursting pressures is available.

Fittings, except standard flanges, are not available at the present time altho they are expected to follow shortly. Molds are now being constructed to make additional flanges, with threaded ells, tees, and couplings to be available in the near future.

Halco "Flexible" Milling Head

The Ajax Engineering & Mfg. Co., 14230 Birwood, Detroit, Michigan, who have recently taken over manufacture also of the Halco Universal Head, report that they have made several engineering changes on their product. The gearing mechanism has been changed, and whereas in the past it was made on a production basis only, from now on it will be a precision tool device. Due to these changes, longer life, greater speed, accuracy and dependability are said to be assured. Manufacturing facilities have been tripled and deliveries are almost immediate.

The Halco Milling Head has proven its importance in building tools, dies, jigs, fixtures, wood and metal patterns and other machine products. Its 4" vertical travel permits many milling, boring and facing operations in one setup.

Million-Volt X-Rays

More than 40 portable, million-volt x-ray units are now in operation or soon to be placed in service in industrial plants making important war material, such as turbines, airplane crankshafts, etc., W. F. Westendorp, of the X-ray division General Electric Research Laboratory, told the American Society for Testing Materials, recently. His paper was prepared jointly with Dr. E. E. Charlton, head of the division.

A year ago, said Westendorp, only one such unit was in use, tho several elaborate and fixed million-volt X-ray outfits had been placed in hospitals for cancer therapy. Equipment is used for radiographing parts made of steel and other metals, ranging from ¼ to 8" in thickness. X-ray pictures, made with exposures of only a few minutes, clearly reveal hidden defects, which may then be chipped out and repaired. Without such examination, defects could not be detected.

Since some of the largest castings examined weigh many tons, and are in wide variety of irregular shapes, he said, it would be extremely difficult to position them easily and rapidly for radiography with a fixed installation such as the hospital unit. Consequently the portable unit, completely enclosed in a metal tank 3' in diam, 4' in length and weighing 1500 lbs was developed. In a plant already equipped for moving large steel castings, this can be handled easily, and moved rapidly into the most convenient position for the best result.

Three factors, he said, made possible such a compact and light-weight unit. These were the multi-section X-ray tube, the new "resonance" transformer, and the use of gas for insulation.

X-rays result when electrons are hurled against a metal target, and they are more penetrating the faster the electrons are made to move.

Soldiers of Industry

We are all in this fight to win—and we can all help by SAVING Ten Minutes a Day with greater care and more production:

	10,000,000	Workers
Gaining	10	Minutes a Day
Save	100,000,000	Minutes
Or	 1,666,666	Man-hours a Day

Increased Production to Speed Up Our Victory!

Imagine what this will mean to our fighting forces and our government—more fighting equipment, more air craft, tanks, guns, tractors, ships and munitions to over-power the enemy!

Your company is behind you and your government is behind you. Let every one of us back up our fighting men like real Soldiers of Industry, with extra effort equal to the saving of 10 Minutes Every Working Day.

Posters, 8½ x 11" carrying this constructive wartime suggestion are available without charge from the Bound Brook Oil-Less Bearing Co., Bound Brook, N. J. Order some for your shop bulletin boards.

Offers Diamond "Know-How"

Desiring to aid the war effort and further free dissemination of "Know How," Oscar Caplan & Sons, 207 W. Saratoga St., Baltimore, since 1905 makers and purveyors of diamond-set tools, bort carbons, rough diamonds and diamond powders, has placed its research and experimental facilities at disposal of plants and executive personnel having special problems or ideas involving use of industrial diamonds.

Anyone with an industrial diamond problem or idea, says Oscar Caplan, head of the firm, may call upon the facilities and experience of the company, which will be glad to cooperate in research, experimental or development operations seeking to solve such special problems.

Should you be interested, you are invited to communicate with the firm.

Serving Assemblers

While the idea of conveyor or straight-line assembly is a splendid one on many items of relatively large size, there are still many uses for the assembler's bench. A variant of the assemble-on-the-conveyor idea is to have a battery of assemblers with a conveyor to serve the benches all along the line. It is possible in many cases, by using shunt bars in connection with a conveyor, to serve assemblers' benches at right angles to the conveyor. There are different ways in which this idea may be used to excellent advantage.

Very often there are parts by assemblers, used continually which may be stored to advantage in overhead hoppers, and drawn upon by pulling a latch string, or depressing a small trip plate. A considerable number of such hoppers may be arranged over a single assembly bench if and when there are a number of parts that may be stored in this way. Assembly operations are thus considerably simplified.

In the case of small unit assembly, small drills, tapping machines, screwdrivers and nut runners may well be a part of the equipment, either placed on or overhanging the assembler's bench. It is often the case that such very light machining operations may be performed by the assembler at the same handling of the stock with which the actual assembling is done, and that represents an advantage. Incidentally, the modern type of hollow-head machine screws are much more convenient for the assembler, and should be favored as much as possible.

"KEEP 'EM ROLLING"

Buy United States War Savings Bonds and Stamps

Details Alco Tool Holders

With full engineering data on its line of Drill Chucks, Tap Holders, Button and Acorn Type Die Holders, Hollow Mill Holders, Etc., new catalog No. 3, Alco Tool Co., 835 Housatonic Ave., Bridgeport, Conn., shows how these 4 types of holders can be efficiently applied to every tapping, drilling, reaming and threadcutting operation.

In obviating need of bushings on drill chucks and tap holders, the firm points the way to production and economy aids which, it claims, merit attention of every operating executive. Claimed, also, for its button type die holders is adjustable concentric alignment feature, saving setup time and eliminating difficulties in getting proper concentricity when using button dies.

The book is very detailed thruout its 20 pages and should find favor with those concerned with stepping up efficiency and economy in production.

Amic Comparator

A new type Comparator of high precision for convenient and accurate checking of large and small lots has been developed by American Measuring Instruments Corp., 40 West 22nd St., New York City.

The instrument is mounted on a heavy accurately machined square cast-iron base, into which is built a parallel ground and lapped table. This table has vertical micrometer adjustment for quick and accurate setting of the Comparator to zero position by means of a Master gauge or Johanson Block.

The magnification is 1:1000. A .001" displacement of the measuring pin causes the hand to move one full inch on the dial of 6" in length. Each inch on the dial is subdivided into 10 lines, each division indicating .0001". Deviations as small as .00002" can be detected with ease. Total capacity is plus or minus .003".

A novel feature is a disk mounted on the axis of the indicator hand rotating in a permanent magnetic field which brings the hand to immediate rest.

A lever on outside of the housing permits lifting of the measuring pin before insertion of the piece to be measured, eliminating shocks to the mechanism and wear of the contact pin.

For additional convenience in final setting, a zero adjustment of the dial is provided. Two limit hands in form of sliders allow indicating the range of tolerance required.

The Comparator has a working height capacity up to 12", a throat depth of 4" and a working circle by swiveling the head of 10". For special applications, a number of backstops and accessories suitable for special components can be delivered in addition to the standard equipment.

Electronic Control for Resistance Welding

A new 38-page illustrated booklet is available, giving a simplified explanation of electronic control for resistance welding, pointing out the different kinds of resistance welding that can be done, the function of the various controls and the degree of accuracy made possible by electronic control.

The various types of electronic control for resistance welding are illustrated and described. The booklet also explains what it is, what it does, and where and how it is applied. Also included in the same publication are 3 pages of application data on the choice and application of a-c single phase resistance welding control; an 8-page bulletin on fundamental electronic circuits; and a discussion of the cathode ray oscilloscope and its application to welding timers.

The heart of all these resistance welding controls is the ignitron tube. Development of this tube answered the long standing problem of satisfactorily interrupting high currents at speeds of 600 operations per minute and above. Its extreme precision and dependability make possible increased production of stronger, more uniform welds of aluminum and other critical alloys.

A copy of booklet B-3102 "Electronic Control for Resistance Welding" may be obtained from any Westinghouse District Office.

The Well-Dressed Welder

To protect welders against painful and dangerous exposure, American Optical Co., Southbridge, Mass., announces a completely new and wide assortment of high-grade welders' safety clothing that will keep hot sparks away from skin and normal work clothes.

A catalog, picturing and describing each of the garments, is available. An authoritative treatise on chrome tanned leather clothing for welders, this catalog is particularly valuable because it informs the welder as to the type of protective clothing he needs on any particular job.

Listed in the catalog are overalls, all-leather pants, hot weather pants, chaps, split leg apron, one piece apron, coat, cape sleeves and bib, short jacket, welders' sleeve, spats, gloves and mittens, sleevelets, and various complete protection combinations. A section of the catalog is devoted to hints on how to break in the safety clothing to get maximum service and wear.

Electrode for "Fleet-Fillet" Welds

A new arc welding electrode, designed to add still more speed to arc welding in war production, is announced by The Lincoln Electric Co., Cleveland.

Designated as "Fleetweld 11", it is created expressly for use with the recently announced "Fleet-Fillet" technique.

"Fleetweld 11" is not only a fast flowing electrode, but gives deeper penetration of metal into the root of the joint. It is of shielded arc type and heavily coated to exclude oxides and nitrides from the weld.

In demonstration, it is said the new electrode welded in 35 seconds a joint that required 1 minute 17 seconds to weld with conventional electrodes and ordinary procedure.

The new electrode and the "Fleet-Fillet" technique are claimed to permit up to 100 per cent faster fillet welding, and to cut production time on welded ships, tanks, guns and other strategic war materials, and permitting the operator to do more work without fatigue. Welding costs are decreased as well as the amount of electrode used per foot of weld.

High currents are used, the electrode is advanced at a higher speed and the weld metal penetrates into the corners where the 2 pieces of metal are joined. The electrode is held at an angle of 45 to 60 degrees with the horizontal plate and 90 degrees with the electrode path along the joint. The arc produced is so short, the electrode coating practically touches the metal.

Having the same strength as a weld made by ordinary methods the "Fleet-Fillet" weld requires less metal. In a typical instance, the new technique required 0.26 pounds of electrode per foot, as against 0.37 pounds by the usual procedure. The cost, now further reduced by the new "Fleetweld 11" electrode, is reported 33-1/3 to 50 per cent less than the usual procedure.

Designed to complete a weld in one pass, "Fleetweld 11" is made in 18" lengths and 2 diameters, 3/16 and ¼", packed in 50 pound cans.

Tool Bits for Hard, Tough Metals

A new line of tool bits for machining hard, tough steels and the copper or aluminum alloys recently has been made available.

These tool bits are made of the same metal that has proved its value to industry in the patented "Hardsteel" drills—also used in "Hardsteel" reamers. This new metal has many advantages when used in tool bits. It is claimed to have greater shock-resistance than most cast or cemented tools —minimizing breakage. It shows higher heat-resistance — permitting higher cutting speeds and deeper cuts.

"Hardsteel" tool bits should fit admirably into war production wherever lathes, boring mills, shapers and planers with tool lifters work on hard or tough steels, such as the 4100 series, the high chrome, high nickel and high speed tool steels. Complete satisfaction is also reported when used on abrasive copper, brass, bronze and aluminum alloys, either rolled or cast. They are especially suited to work on heavy forgings where deep rough cuts can be made at faster cutting speeds, but at the same time, give excellent results when used as finishing or forming tools.

Two other factors make these tool bits inexpensive in use. Since they are of solid "Hardsteel" they can be reground on an ordinary wheel time after time. But because they take abuse and operate efficiently at red heat, they need less frequent regrinding.

The bits are made square or round from ⅛" up in all the usual sizes by Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio.

The Doall Contour Saw Laboratory

The manufacturers of Doall Precision Saw Bands announce the further expansion of their Contour Saw Laboratory, and the housing of this department in a building separate from the main plant, 1206 Thacker St., Des Plaines, Ill. Foremost in customer service departments, the Laboratory has long been called upon to solve the cutting problems of narrow blade saw users thruout the country. Now, more than ever before, buyers everywhere have need of the data assembled by these technicians.

Superbly equipped — complete from photomicrograph and Rockwell testing equipment to a special darkroom, the laboratory solves cutting problems (without charge) presented either by mail or thru territorial representatives.

At the conclusion of each test, when the question has been answered and a plan for production sawing worked out, a detailed report is sent to the customer. To this is attached a photograph of the actual cutting, also drawings (where required) showing the progressive cuts, and recommendations for jigs or other fixtures.

Among recent tests have been one which called for designing a self-centering jig for notching precision machine parts within close tolerances without a layout line, and another which involved a "two at a time" operation in machining machine gun slides. Working new plastics; sawing materials which are new to plants converting to war work, helping users choose the best saw width and pitch for cutting materials which replace others given over to the making of vital parts; all these come within the scope of the Laboratory.

Frequently recommendations can be given over the telephone or by wire—sometimes days are spent in determining the best possible combination of finish and cutting time.

Saves Handling Equipment

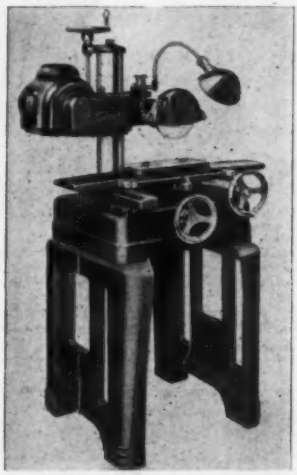
A new, condensed catalog, issued by Lyon - Raymond Corp., 1017 Madison St., Greene, N. Y., points out that the average dollar invested in material handling, these days, releases 1 to $3 worth of labor for other defense work, each year. Makers of hydraulic lift-trucks, elevating and other equipment, this latest catalog No. 130, presents handling devices that run virtually the entire gamut of industrial needs to step-up production with safety and economy.

Among the hydraulic apparatus detailed are lift trucks, pallet trucks, elevating tables, die-handling trucks, sheet-handling trucks, stacking, tiering, hoisting equipment.

The firm also manufactures aircraft servicing and production equipment and special-purpose production machines, hydraulically powered.

Delta Surface Grinder

A new type surface grinder is announced by the Delta Mfg. Co., 604K—E. Vienna Ave., Milwaukee, Wis. It is versatile, easy to operate, portable, low in cost and it should be useful in tool and production shops. Interesting features include:



(1) A unique wheel-mounting arrangement that utilizes a 2-piece adapter, so that either wheel, or wheel and adapter, can be removed. The advantage of this is that once a wheel has been trued up, it can be removed and replaced with the adapter and without any further dressing.

(2) A carefully designed spindle, which is the "heart" of any grinder, is made extra-long with widely spaced bearings at either end, for permanent true alignment. The forward bearing is a large surface taper bronze bearing. It runs in a continuous bath of oil. A take-up is provided to eliminate play. Rear bearing is a sealed-for-life bearing that requires no lubrication.

(3) Improved table, smooth operating, with conveniently located control handles. The table has long ways so

that it never "hangs" over end of machine—but is always riding solidly on the ways. Gibs are provided so that play may be eliminated. Micrometer collar, with wide graduations on the traverse adjustment permits accurate settings. The table is provided with T-slots for clamping fixtures or magnetic chuck in place.

(4) The specially designed column is of one-piece construction, cast of hi-tensile iron, normalized and accurately ground to close tolerances. A steel gib guides the bracket yoke so that it is always in alignment. The entire column, together with bracket, may be rotated 360°.

Actual specifications are:—Maximum length that can be ground, 13½"; maximum width, 6"; maximum space under 7" wheel to table, 9½"; maximum space under 7" wheel to B & S No. 510 Magnetic Chuck, 6"; Table surface 5¾"x 13"; Traverse feed, one graduation is .001"; maximum adjustment of wheel by means of micrometer is ⅜". Each graduation is .0005". Minimum diameter cup wheel with standard guard in place, 3½"; maximum diameter wheel, 7".

"KEEP 'EM ROLLING"
Buy United States War Savings Bonds and Stamps

THE WILL TO WIN

(as spontaneously expressed by a Cushman employee)

Some time ago when the enemy struck
"Right into high" went Cushman Chuck
Machines were pushed . . . with the dedication
"MAKE MORE CHUCKS to protect the nation".

We'll make the chucks for many a lathe
To turn the enemy into his grave
To build a gun . . . and finish a plane
And drive the Axis back again.

Some of the boys have gone to war
To fight for the things worth fighting for
So it's up to us to help this crew
That worked at a bench with me and you.

The more we produce and the more we give
Will make more certain our pals will live
They'll be thinking of us in foreign lands
With thanks for a chuck and for what it stands.

They know what it means as a tool of war
They know from the battle just what it's for
That without a gun there'd be no pluck
And THERE'D BE NO GUN without a chuck.

So all of us here at Cushman's work
Will boost production . . . never shirk
With a steady stream of chucks for the nation
. . . America . . . Cushman . . . cooperation.

Eugene Pilkington

WORLD STANDARD FOR PRECISION

CUSHMAN

THE CUSHMAN CHUCK CO. HARTFORD, CONN.

Arbor Supports

Importance of milling machine arbor support design is greater than may ordinarily be supposed. To have a support relatively light in weight, and which will readily slide off and on to the overarm, is to have a decided operating advantage. In common with other places where lightness of a machine part is important, aluminum has been used for making some of these supports by many leading milling machine builders. In one miller, the supports are cast from a special aluminum alloy and are heat treated to give additional stamina. These supports slide on dovetailed ways on the overarm.

Have you ever seen a center arbor support for a milling machine arbor that was made in halves? One outstanding milling machine manufacturer made a machine of this kind and put it on the market a number of years ago. It is a very clever touch in milling machine design. There are 2 cylindrical overarms on the machine, arranged in parallelism, and the 2 halves of the center arbor support mentioned are mounted on these 2 overarms, so that they will swing or hinge thereon. It follows that when it is desired to remove the arbor, it is only necessary to unlock the 2 halves of the center support (they are designed to lock together) and swing each aside on its own overarm. This feature is especially valuable where it is desired to keep the setup on a given arbor undisturbed, for some standard job, and allow cutters to be set up in advance on another milling machine arbor for the next job. There is less down time for the machine by following this process.

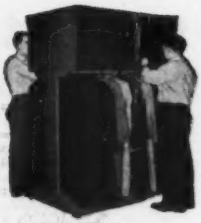
"O-U-Tack"

A new professional tack rag, the O-U-Tack, said to eliminate the use of solvents and save time in cleaning dust and over-spray prior to painting, is announced by the Robinson Specialty Mfg. Co., 816 West Fifth St., Los Angeles, Cal.

The O-U-Tack is flexible as to tackiness and does not dry out in storage. If the user desires more tackiness, a small amount of heat can be applied; if less tackiness is desired, the rag may be hung in the open air. O-U-Tack is said to be particularly applicable when preparing aircraft skins for synthetic enamel as it completely removes metal dust and other minute particles developed in drilling and riveting. Full-sized free samples are offered to anyone writing for them on a firm letterhead.

A safety feature of vital importance in paint shops today is O-U-Tack's immunity to spontaneous ignition.

LOCKERS



SHOPROBE
(Dept. No. 8 202-427)

CABINET

ENGINEERED IN WOOD FOR THE DURATION

Three products necessary to wartime industries but limited by steel priorities are now offered in wood by Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill. They are shoprobes, lockers and cabinets. Portable shoprobes provide fill length coat-hanging space, private locking compartment at convenient height for each employee, and are especially suited to industries in which personnel fluctuates and low storage cost is required. 20-person unit (double-faced) requires only 13-3/5 sq ft of floor space. 10-person unit (single-faced) requires only 6-4/5 sq ft. Lockers have hardwood tops, bottoms and frames. Sides, backs and doors are pressed wood. Doors consist of 2 panels of pressed wood mounted on hardwood frame. 5 stock sizes are available—4 single tier and and 1 double tier.

Cabinet tops, bottoms and frames are hardwood. Backs and sides are pressed wood panels. Doors are made of 2 pressed wood panels mounted over hardwood frame and attached with 3 tight - pin hinges. Three types—storage, wardrobe and combination. Two sizes: 36"x18"x72" and 36"x24"x72".

All units finished inside and outside in green enamel.

Possibly the method found best where there is considerable local annealing to be done continually, is to use some sort of gas-fired equipment. It allows heat to be closely localized and governed, and thus allows of more uniform results. One automatic, gas-fired annealing machine will spot-heat steel parts up to 2 ft in diameter. The machine is especially designed to save gas, in that it consumes about 100 cubic ft per hour per burner while it is actually heating the work, but during the loading periods of the equipment the burners are throttled to a rate of around 15 cubic feet per hour. The work moves into place and out, the burners are turned on and throttled, and reflecting baffles come into position to reflect the heat on the work, and then retire, all automatically.

Localized annealing machines can be designed for practically any type of work, and there are firms experienced in this line that are ready to furnish either tip or fishtail burners for this purpose.

Localized Annealing

Different methods have been resorted to for annealing spots of steel parts. Some have used makeshifts of different kinds with more or less indifferent success. There is some understanding that in jig, fixture and die work, resistance welders may be used successfully to anneal in certain spots or areas, in order that those portions may better resist shock, or to soften the material in some degree for later machining operations.

Buy U. S. War Savings Bonds and Stamps

For Removing Stresses In Weldments

To remove stresses in weldments, a large midwest farm implement plant has installed this new type car-bottom stress relief furnace. The new furnace, designed by Despatch Oven Co., 722 Central Ave., Minneapolis, Minn., has completely automatic heat control.

Simple operation of a few dials provides desired time-and-temperature combinations for preheating, soaking and cooling.

Weldments are loaded on rugged, heavy-duty, insulated cars which enter the furnace thru either of 2 lift doors at opposite ends of the heat chamber. Thus 2 cars may be used, 1 being loaded while the other is in the heat chamber.

Car-bottoms, usually operated by winches, are carefully levelled when installed. This permits correct balancing of loads and minimizes danger of distortion which might result from off-level car platforms.

Effective sealing of the work chamber to promote even interior heating is provided. Electrically operated doors at each end of the furnace slide down smooth channels to form sand-seals at both ends of the car. As these doors

escend to the bottom of the channel-rooves they are forced snugly against roperly designed steel members. Finally, sand—flowed mechanically along des of the car bottom — completes ealing of work chamber.

Secret of close temperature control es in balancing of heater, fans, and irculating ducts on each installation. eater is of heavy capacity, connected ith a specially designed high-volume n of alloy steel. Each fan is delicately alanced with extreme care and has atented shaft-cooler to withstand ard, continuous operation with least tention or repair.

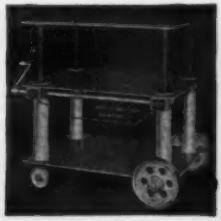
Distributing ducts have graduated orts, each tested with an anemometer nd adjusted accordingly. Adjustment always made after the furnace is stalled so that fast, even flow of eat thruout chamber is obtained. Reorts from various installations, says e maker, show heat distribution thus cured is highly uniform.

Automatic control equipment permits perator to follow predetermined cycles of heat treatment, simply by setting the dials. Control covers any desired time and temperature thru pre-heating, soaking and cooling. When specifications for a new load require a different time or different temperature, new control settings can be made instantly—an important factor in flexibility.

Williams Powerplant Equipment

The Williams Gauge Co., 2073 Pennsylvania Ave., Pittsburgh, Pa., offers Catalog No. 142 describing its complete line of power plant equipment. This new 24-page catalog, which is profusely illustrated, contains technical data on such Williams Specialties as pump valves, water gauges, steam pump governors, gauge cocks, ball-type high pressure steam traps, safety feed water regulators, high and low alarm columns, flanged silent check valves and standard feed regulators.

Copies of the catalog will be forwarded gratis if requested on company letterheads.



Heat Treat Bulletin

Park Chemical Co., Detroit, maker of Park Salt Baths, announces appointment as exclusive sales representatives for territories east of the Mississippi (except Iowa) for Thurner Carbo-Cleaner, machine used for cleaning used carburizing compounds.

New bulletin No. 100, just released by the firm, details its salt baths for heat treating carbon and alloy steels, high speed steels and non-ferrous metals. In internally-heated furnaces, capable of "case" depths to .125" and with temperature range of 300°-2400°, the firm advances salts as a highly efficient heating medium, due to higher thermal conductivity, cleanliness, prevention of scaling and decarburization, with minimum distortion, cracking and pitting. The bulletin gives complete details.

Park has pioneered in the field of liquid and solid carburizers, developing, in 1911, Woodside's Rapid Carburizer.

The firm will exhibit at the National Metal Exhibition, Cleveland, in October.

Haskins Jr. Catalog

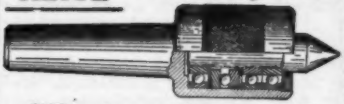
Stressing the innumerable occasions for use of flexible shaft machines in the average shop and illustrating types for applications most commonly encountered, R. G. Haskins Co., 623 S. California Av., Chicago, has issued a 3¼x6¼" Junior Catalog, No. 1-F.

Some 23 types are detailed. They range from machines adaptable to light work to large, castered models for heavy grinding with wheels up to 6" diam.

Two types of the firm's line of power screwdrivers are also described and illustrated.

The Jr. Catalog, says the firm, is intended to portray the wide range in the Haskins line of flexible shaft machines.

The booklet is a valuable treatise on the versatility of flexible shaft machines, with illustrations of models and their especial adaptability to specific jobs, many of which are covered thruout its 30 pages.



Wins $200 CAI Award

Describing successful application of compressed air to increase speed of producing cartridge cases by about 500 per cent, A. W. Lancaster of Orillia, Ont., received first prize of $200 in the Compressed Air in Industry Contest.

Award was made by the Compressed Air Institute of New York, which conducted the contest to increase the widespread interest and application of compressed air in industry, transportation and many other activities.

There were 3 second prizes of $100 each and 10 third prizes of $50 apiece for papers showing many striking advantages of compressed air in industry and national defense.

One of the second prizes went to Irving G. Mayer of Phoenix, Ariz., a chemist at Arizona Refining Company, who showed how compressed air may be used in rapidly laying a mat of asphalt on roads and other structures. Asphalt, mixed with rock or stone aggregate, is shot thru a nozzle onto the pavement or other place where it is to be applied. He pointed out that this method would be especially useful in national defense if a road is blown up by a bomb and must be repaired at once.

Winner of the Compressed Air Institute's first prize told how efficiency of cartridge case machines had at first been increased 100 to 150% by substitution of air operated mechanism to locate cases in the machine and eject them. This not only increased efficiency of production, but reduced operator fatigue.

Compressed air was turned on and off by a hand lever situated on the headstock of the lathe. The next step was to eliminate the hand lever. Lever was replaced by a dual control air valve conveniently situated on bed.

Defense Lighting

New developments in war-time lighting, including use of "glare barrages" to protect vital industrial plants, were described at a recent 3-day meeting of field engineers of the Westinghouse Electric & Mfg. Co. Lighting Division. A glare barrage is just the opposite of a black-out, bright lights and glare being used to confuse air raiders in locating specific targets.

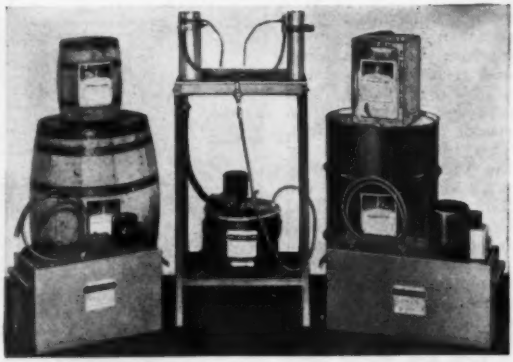
Among lighting innovations discussed was use of horizontal glare barrages which blind potential saboteurs during attempts to enter industrial properties, yet at the same time provide perfect visibility for plant policeman to detect intruders, placing them at a discouraging disadvantage, which should materially reduce the hazards of this type to plants thus equipped.

Announcement was made at the conference of a new type fluorescent lighting unit which cuts steel requirements per unit from 16½ down to 8½ lbs, thus releasing many hundreds of tons of steel for armament production.

Application of a new 3-kilowatt high-intensity mercury lamp for war production industries was also discussed at the conference. Noting that WPB has placed special emphasis on use of adequate levels of illumination to provide top speed vision for workers engaged in the production of vital war goods, the new unit was designed for industrial use to meet this need.

How airports in combat areas must provide for operations in blackouts by "strip" lighting was described by W. C. Norvell, Westinghouse aviation lighting engineer. Strip lighting, he explained, means that a pilot takes off or lands between two strips of lights lining the runway, while the remainder of the airport is in darkness.

Gray-Mills Offer New Coolant Line

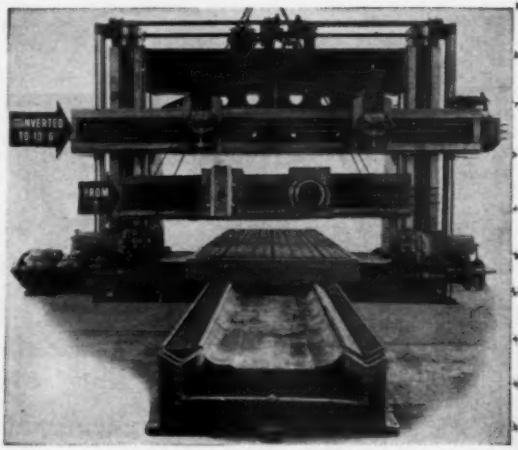


A new line of quality metal cutting coolants has been developed by the Gray-Mills Co., 215 W. Ontario St., Chicago, enabling their nation-wide distribution outlets to offer immediate deliveries from stock. Realizing the inconvenience to many shops of purchasing large quantities, the new "Flo-Bac" coolants are offered in a wide range of container sizes:—3, 5, 15, 30, 50, and 55 gallons. They are manufactured in 4 types to cover practically every requirement and are available in wooden containers (to conserve steel and expedite shipments) on priorities up to A-10. Steel containers require A-1-J or better.

Their new "Flo-Bac" coolants, combined with the Portable Coolant Systems, make it possible for this company to offer a complete answer to the problem of obtaining cutting fluid advantages on all small, large, or special machine tools.

Converting Planer to Larger Size

The illustration presents an unusual job of machine tool rebuilding and is indicative of the all-out conversion achieved by industry to speed the war effort. This planer, owned by the Vulcan Iron Works, was converted by the Simmons Machine Tool Corp., Albany, N. Y., from 7' between housings to 13' 6" between housings. Vulcan needed such a planer for producing the main engines of heavy cargo vessels. A new one would have involved waiting nearly a year. So Vulcan sent an available planer to Simmons to be converted to the desired width.



Simmons took this planer and, by providing a new rail and bridge, together with widening blocks between the housings and the bed, converted it to 13' 6". This photograph shows the comparison between the new rail and the old one directly beneath it.

E. Perry Holder, Vulcan president, wrote:—"The time for getting a planer of these specifications into production was shortened 75% by your Rebuilding Program, thus enabling us to speed up our deliveries and help the transportation problem in general."

Portable Fluorescent Light

Adjustable from 30" to 7' and designed to project light into many inaccessible places is a new portable fluorescent service light recently developed by Lumidor Mfg. Co., Los Angeles, Cal.

The Army first ordered the light for servicing planes at night, but it has been widely adopted by industrial plants. Aviation industries are said to use the device indoors to project light under wings and fuselages, areas, invariably in overhead lighting. Outdoors, it is easily portable (merely tipped and rolled on its casters) and throws illumination in any direction.

Upward or downward, horizontally or vertically, or in any angle of a 180° arc, the unit is adjustable without use of tools and is said to illuminate with a long source of cool, comfortable fluorescent light which permits close working arrangements and reduces shadows. A balanced cast iron base makes the light practically impossible to upset. Other features include power factor correction for two 48" 40-watt fluorescent lamps; high-baked enamel reflector; and, if desired, a screen can be supplied to protect the lens.

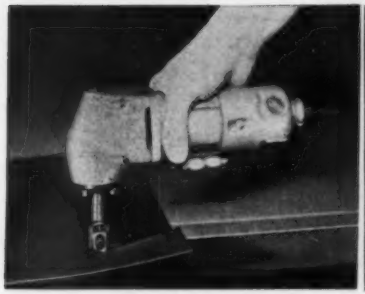
Salvage

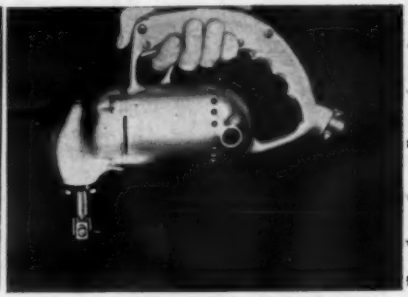
Ashes taken from two process-steam boiler pits in the salvage department's shop are yielding critical materials at one of the General Electric Co. major works.

Shop refuse and rubbish from all parts of the works are used for fuel. Ashes removed from the boiler pits are passed thru a ball mill, or grinder; a magnetic separator, which separates the ferrous from the nonferrous metals; and a concentration table which sorts out the finer particles. Metals reclaimed by this method include iron, steel, brass, copper, and aluminum. In 1941 a total of 624,000 pounds was recovered, representing a gross cash return of $10,000.

Other items, which in the past have been unsalvageable economically, are yielding critical materials in quantities that are worthwhile in these times. For example, the salvage department receives from the wire-drawing department a waste known as "copper and grease." It is taken from the pits under the wire-drawing machines and consists of a mixture of wire-drawing compound and fine copper particles. The wire-drawing compound is in liquid form, and contains water, soap and tallow which is applied to the drawing dies for lubrication and cooling. This flows into a pit underneath the wire-drawing machine and carries with it fine pieces of copper. It is shoveled from the pit into steel drums and when the water and grease are removed, the copper remains in dry, hard chunks. Last year 88,200 pounds of copper reclaimed in this way were shipped out to the smelters and vendors for conversion into raw materials. Gross return: $8,000.

Improved Models of Black & Decker Lectro-Shears





Both the 16 gauge and 18 gauge Lectro-Shear have been re-designed by the Black & Decker Mfg. Co., Towson, Maryland, to improve their ease of handling and operating characteristics.

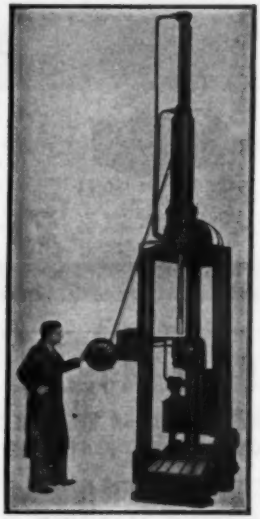
The No. 18 Lectro-Shear has been reduced in outer dimensions, so that the motor housing forms a comfortable operating handle. This greatly reduces the length and weight of this tool, and vastly improves the operating balance and control. Power and capacity of the tool are the same as in previous models, cutting up to No. 18 gauge sheet steel.

The larger No. 16 Lectro-Shear has been equipped with an improved operating handle which gives this tool better balance and easy control on curved and irregular lines. It is equipped with an instant release trigger switch, with locking pin for continuous operation. The handle is so shaped that it can be used over the tool or at the rear end. The power and capacity of this tool are the same as in previous models, cutting up to No. 16 gauge sheet steel.

Buy U. S. War Savings Bonds and Stamps

Automotive Honing And Lapping Machine

Designed for honing cylinders up to 24" diam, with 20 to 72" strokes, this machine, when used with any standard honing head, will produce accurate, straight, round, smooth bores, according to the builder Automotive Maintenance Machinery Co. 2106 Commonwealth Ave., North Chicago, Ill.



It is a production machine, said to be very flexible as to spindle speeds and reciprocation, to assure fast removal of material by honing, in a wide range of work: engine cylinders, supercharger parts, gun barrels, landing-gear struts, recuperator cylinders, etc. The machine is available in 4 standard models, with stroke up to 72" and with any distance under spindle nose to suit requirements.

All controls are at the front. Stroke-setting, hone withdrawal, short-stroking at any point, speed changes in rotation or reciprocation are conveniently governed from operator's position.

Available at extra cost is a positive

stop and dwell system by means of which spindle can be stopped without shock or impact at bottom of each stroke, at any point within stroke-range, holding spindle at that point, without reciprocation up to 1½ minutes, said to be a great aid in blind hole honing and straight line lapping or honing.

Detailed pamphlet issued by the firm gives all data on all models.

Huge Norton Grinders

In envisioning Victory, Norton Co., Worcester, Mass., is designing heavy ordnance grinders, now being built for 1942 delivery, for ready adaptation to finishing of crowned rolls, in peacetime.

In a beautiful, colored folder, 25½x 11", it pictures one of these grinding machines, having 40' capacity between centers. Under construction, states the folder, is another machine of this type with capacity of 68'.

Featured in the machines are: all V-belt headstocks which, with motor, weigh 8 tons; exceptionally long wheel carriages, on which grinding wheel head, control and pushbutton panels and carriage traverse mechanism are mounted. From operator's position on wheel carriage, action of grinding wheel on work can easily be observed. All controls are within easy reach from this position. These include motor-driven swivel adjustment with vernier scale, enabling quick, accurate taper-settings to be made.

Provision has been made so the roll crowning mechanism can be added, later, for peacetime conversion. Claimed for the crowning device are 1-Concave or convex rolls can be ground, simply by changing cams . . . said to be easier than changing a tire. 2-Once set, same crown is produced on all rolls thereafter, with accuracy. 3-To readjust for amount of crown takes but a few seconds, 4-Crown produced is a true deflection curve, objective in most rolling mills.

Contained, also, in the folder are full specifications of the machines. These, by their large size and massiveness convey the impressive hugeness of these grinders.

Luers Blade Holder

Empire Tool Company, 8782 Grinnel Ave., Detroit, announces introduction of 6 new tool holders designed for accommodation of Luers patented cutting-off blades on 6 additional types of screw machines.

Their development broadens use of Luers blades, already extensive, to include adaptability on the following makes of machines: Greenlee 4- and 6-spindle Automatics, New Britain Automatics, all lathe and hand screw machines with round posts, Acme-Gridley R and RA Series, and Gridley Models F and G Multiple Spindle Automatics.

The Luers Holders are unique in design and construction and claim features said to step up efficiency in cutting-off operations.

One of them is ease, speed, and simplicity with which a cutting-off tool can be set up in machine and the facility with which an operator can remove blade for resharpening and later replace it, precisely in original position, without disturbing the set-up.

The Luers blade is held in place as securely and rigidly as any forged blade by means of 2 unique cams which force top surface of blade against ground surface of holder to provide solid bearing. Altho capable of exerting a bull-dog grip on the blade, locking device, nevertheless, can be made to release blade quickly and simply. Initial setting and re-setting of blade is very simple.

An ingenious arrangement on locking wrench serves as blade-setting gauge and provides efficient means for accurately resetting blade after resharpening.

Ajax Floating Holders

The Ajax Engineering & Mfg. Co., 14230 Birwood Ave., Detroit, Mich., announce a new Floating Holder of the B. & S. type, furnished in the latter's following numbers:—B & S No. 00, B & S No. 10, B & S No. 12, and B & S No. 14. It is said these holders are made of a special alloy that has been tested and proven to stand the stress in use on screw machines.

Ajax have increased their production facilities to meet wartime demands, and immediate delivery is possible at this time.

They maintain a 30-man engineering staff that will be glad to discuss problems in connection with floating holders.

REID

Hand Feed

SURFACE GRINDER

Head elevating hand wheel is beside table feed hand wheels for ease of operation without loss of motion.

Grinds work 18" long, 6" wide and 11" high with a 7" diameter wheel. Work table is 51" x 8" with working surface of 18" x 6". *Write for folder.*

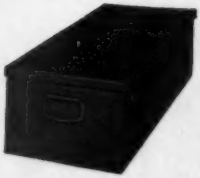
Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 Charles St., Providence, R. I.

TOP RIM STACKING BOXES

FOUR STOCK SIZES.



Orderly storage of parts in convenient, all-welded, stack boxes saves valuable production time.

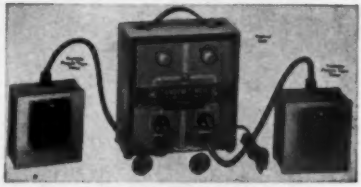
Bench legs of 14 ga. channel iron, all-welded joints. May we quote on your standard or special requirements.

STERLING

FACTORY EQUIPMENT CO

183 CHARLES ST., PROVIDENCE, R. I.

Tandem Timer



The "Tandem Timer" is a new timing device presenting unusually versatile features of particular value in production departments, laboratories, and for life testing of electrical apparatus. It is made by Industrial Timer Corp., 113 Edison Place, Newark, N. J., and permits practically any timing sequence that may be desired. It is essentially a control unit with 2 individual and variable plug-in type timing elements. With the timing elements adjusted to their correct respective time intervals, each cycle of operation will follow the other continuously in regular sequence. When the timer dials are once set at the time interval desired, further adjustments are unnecessary until a new sequence is required. The automatic reset features of the "Tandem Timer" makes a continuous, as well as a single cycle of operation possible. Plugging in of different timing elements is accomplished in a matter of seconds.

Six standard models are available, offering settings from ¼ second to 2 hours 45 minutes. Longer cycles are built to specification.

Industry's Newest Tool . . .

MEAD BANDSANDER

It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many "kinds". F. O. B. Chicago, $14.95.

MEAD SPECIALTIES CO.

15 S. MARKET ST. DEPT. 16-Y CHICAGO, ILL.

WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR

Sizes ½" to 4" Pipe

Literature and Prices on request.

RESULTS — — — — GUARANTEED
NO ABSORBENTS — NO CHEMICALS

JAS. A. MURPHY & CO.

HAMILTON, OHIO

More Speed

WITH THE

NEW

CARDINAL AUTOMATIC *Speed Vise*

WRITE FOR BULLETIN

CARDINAL MACHINE COMPANY

INCORPORATED

GLENDALE, CALIFORNIA

"The ~~SPEED VISE~~ Manufacturer"

Charts Victory

No graph of any American activity better forecasts doom of the Axis than this one of machine tool production, appearing in a recent issue of "Machine Tools," organ of NMTBA, Cleveland. The rate at which the nation's machine tool industry has been accelerating machine tool production staggers the imagination, states the lead article, "Machine Tool Output Charts Victory." Last year, production reached $775,000,000, an all-time high. In the first 6 months of this year, says NMTBA, production averaged more than 1½ that for the corresponding period of last year.

Illustrated articles, on women manning machine tools and auto plants tooled up for war production, portray the significant part played by the industry in furthering America's victory-bound war effort.

Fluorescent Light Care

Critical materials are required in the manufacture of ballasts and starters, essential to the operation of fluorescent lamps. Because replacements are difficult to obtain, proper maintenance of fluorescent equipment is extremely important these days as a conservation measure, says Edison Industrial News.

At the first indication that a lamp is not operating properly turn it off immediately and have the fixture checked by a maintenance man. When a lamp blinks on and off for a considerable time, there is usually something wrong. If allowed to continue, the starter may be damaged, ballast injured or life of the lamp reduced.

Fluorescent lamps, like incandescent bulbs, have a rated average life. For 40- and 100-watt fluorescent lamps, sizes commonly used in factories, average life is 2,500 and 3,000 hours respectively.

In general average life can be affected by the number of times a lamp is turned on and off. The coating or activating material on the electrodes is dissipated much faster when the lamp starts than during normal operation. When used up, the lamp blinks off and on and hot electrodes frequently create a deep orange glow at the ends of the tube.

During normal life, a fluorescent lamp has a tendency to blacken. However, discoloration should not be noticeable during the first 500 hours of operation. Near the end of its life a lamp usually blackens at either end. Dark rings may also appear about 2 inches from base of tube. Improper starting may have some effect in producing these rings, but they are usually a natural development. Should a dense black spot appear early in the life of a lamp, very often it indicates high circuit voltage.

Rotary Hack Saw

The Rotary, made by Misener Mfg. Co., Inc., Syracuse, N. Y., is said by the maker to cut clean and finished round holes in steel, sheet metals cast iron, slate, wood, plastic, fibre and Bakelite. With use of abrasives, it is claimed the saw will cut marble, tile and porcelains.

The saw cuts circles thru wood up to 2½" thickness, according to the maker.

It is said to increase the range of a ½" electric drill to 3½", and a ⅝" to 7". Types are available for both electric drive and for use with bit-brace. Blades are semi-highspeed type, 1" in depth, with others ranging in depth from ½ to 23/4". Cuts are made ¼" less in depth, as ¼" is taken up by body of the tool. Special diam, saws can be had to specifications singly or in quantity.

The firm offers literature containing full details and specifications to interested parties.

Productimeters Catalog

Titled, Speedometers of Industry, Bulletin No. 100, newly released by Durant Mfg. Co., 1229 N. Buffem St., Milwaukee, displays a wide range of applications in which its counting devices are used to aid production control in modern plants. Among such are applications on can-sealing machines, turret lathes, punch presses, drill presses, wire-measuring, and others.

The firm makes varieties and models of counting devices and tachometers said to meet almost any possible counting problem. Types range from hand-operated to devices actuated by photo-electrical control. Listed, also, are some 28 representatives and distributors in as many American cities as well as in Australia.

AMIC Comparator

This modern instrument is designed for accurate, convenient and quick checking of components, either in the tool room or on the production line—permitting precise gaging throughout the whole day without eye fatigue. Each small line on the scale represents 1/10,000th of an inch.

A Remarkable Improvement

Clear reading is provided on the 6" large scale, with inch and millimeter readings. Magnification is 1000.

Measuring capacity is plus or minus .003" and plus or minus .05 mm.

Pointer immediately comes to rest.

Pointer moves in the plane of the scale, thus avoiding any error in measuring due to parallel axis.

Provision is made for convenient lifting of the measuring pin.

Two fine adjustments assure easy setting.

Convenient red mark limit hands control the tolerance required.

Interchangeable backstops and accessories.

Our longstanding experience is at your disposal. Consult us regarding your measuring problems—we will solve them.

AMERICAN MEASURING INSTRUMENTS CORPORATION

40 WEST 22nd ST., NEW YORK, N. Y.

Uses of Cork

Among the many highly interesting uses for cork, one that is perhaps less known than many of the others is that of sandwiching in a light layer of cork composition between parts being assembled, when one or more of the parts is particularly susceptible to shock, breakage, or fluid leakage. A case in point is found where glass or porcelain must be assembled to metal. Cork is compressible to a considerable degree, and yet it has a continually enduring resiliency. Therefore, under relatively light pressure in the assembling operation, thru whatever fastening devices may be used, cork compresses sufficiently to hold the parts firmly in their relative positions, and is an ever - present shock absorber to prevent breakage, at the time of assembly and afterward.

Gasoline, oil or greases have no destructive influences on cork that are worthy of mention. Since cork is not subject to progressive deterioration, it will usually last for the full lifetime of the mechanism or the equipment to which it is applied. Circular knives for cutting cork and similar materials are made by some of our outstanding circular saw manufacturers. In cases where cork must be applied, and show considerable tensile strength, the required strength is given by reinforcing layers of cork with layers of fabric. The same circular knives mentioned as suitable for cutting cork, are also recommended for cutting fabric, and in consequence this happy combination may be cut with the same tools.

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Flat Spray Nozzles

Chain Belt Company has issued a new illustrated folder describing its Rex Spray Nozzles. Illustrations of this ingenious device in the folder show various uses which range from cooling fruit in packing plants and cleaning trolley busses in garages to washing logs in lumber mills or descaling sheets and plates in steel mills.

The nozzle itself is described as a non-clogging device which throws a flat, fan-like, hard-hitting spray with such force that it removes dirt and grit from the most irregular surfaces. The high velocity spray is so concentrated that it produces an extremely thin line of impact which amounts to a sharp cutting action. The device was originally developed for cleaning traveling water screens and because of its unusual effectiveness has since been adapted to many other purposes. The folder is known as Bulletin No. 409.

Hobart Paper Has Pep

No easy matter, is the job of providing a house-organ that clicks on all counts: interest, informativeness, value to firm and employee. Hobart Arc Welding News, by Hobart Brothers, Troy, O., achieves this enviable objective. Whether seasoned weldor or war-fledged neophyte, the magazine holds meaty matter for all . . . all the way from detailing intricate applications of welding to war-production needs, to making your own farm trailer or electric lawn-mower, entirely by welding. There's even a story of building a fire-proof gas station by welding scrap pipe for the frame and covering with sheet metal. This in the case of one who suffered 5 previous fires, to the grand total of $68,000 and who decided upon the unique construction as a final resort.

It's a publication that every weldor, present or prospective, will find valuable.

Screw Products Catalog

Manufacturers Screw Products, 296Y West Hubbard St., Chicago, announce publication of a somewhat revolutionary Screw Products catalog, 96 pages and cover, in which all items conform to the revised suggested stock size lists, as per the maximum price regulation No. 147 of the O.P.A.

The book is exceptional in its coverage of the Screw Products Industry, and in the manner in which it is sectionalized for easy reference, with one complete and 12 sectional indexes. The catalog contains not only list prices, but also complete technical data, giving weights and dimensions of various products. It features, for example, one entire section devoted exclusively to AN products for the Aviation Industry.

The book is supplied gratis to any engineer or purchasing agent who will write for it on his business letterhead.

Man Made Weather

Engines for airplanes of the future are constantly being tested by the Army Air Force to determine performance at different altitudes, temperatures, and humidities. They are tested not only at altitudes as high as 40,000 feet, where temperatures drop to -67 F and where air pressure falls to 5.54 inches of mercury (absolute), but also at low altitudes over deserts, where the temperature soars to 120 F, the relative humidity amounts to only 5 to 10 per cent, and the pressure may rise to over 29 inches of mercury.

Engines undergoing test never leave the ground, but meet these extremes of atmospheric condition in Army Air Force laboratories, where refrigeration equipment, electric heaters, and evacuating equipment are taking over for the elements.

Such a laboratory will soon be put into operation in the United States. It will house several test chambers, all of which will be testing engines under different conditions. To accomplish this, air will be partly conditioned and then delivered to the various test chambers by a 250 - horsepower blower. At each test chamber the air will be further conditioned to obtain exact humidity, temperature, and pressure for the particular condition desired, and then delivered to the engine carburetors.

If air of extremely low humidity is desired, it will first be dropped in temperature to a point as low as -70 F to condense out the vapor, which will separate from the air in the form of snow or frost. The dried air will then be reheated to the proper temperature by G-E finned Calrod heaters before being delivered to the carburetors.

Mechanics' Handbook

The 4th Edition of the Practical Mechanics Handbook with 390 illustrations, by F. J. Camm is a handy reference volume for mechanics, engineers and draftsmen. It is published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., and the list price is $4.

A decidedly helpful feature is the cross-referenced index, facilitating the tracing of tables, data or information.

The initial chapter on Mensuration leads into Powers and Roots of Useful Factors and Trigometrical Functions followed by discussions of the Metric System and English Weights and Measures.

Principles of Mechanical Drawing are next considered with a section on blueprint reading, etc., all clearly detailed.

Swinging into Shop Practice, is an interesting description of the use, of Micrometer and Vernier, followed by chapters on Drills and Drilling; Special Cutters; Reamers; Other Cutters; Small Taps, Dies, etc., Files and Filing and Marking Out for Machining.

Lathe Tools and Tool Angles; Turning Between Centers, Boring and Screw Cutting are next considered. These subjects are followed by a discussion of Lathe Equipment; Lathe Centers; Lathe Tool Bits; Grinding Operations and Grinding in the Lathe. Dividing Heads and Gears are explained in clear concise style and amply informative detail.

Considerable useful information is given on Soldering and Brazing; Laps and Lapping; Clamping Work on Machines; Riveting; Polishing and Finishing Metal, making the work a worthy addition to shop and office files.

Plants for Subcontract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Goverment Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARrison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in The BLUE BOOK. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-48—Tool and Machine Works in Massachusetts offers for subcontract work the following LATHES:—P&W 12"x5'; Rockford 16"x 5'; Reed-Prentice 12"x4', 16"x10', 12"x6'; Lodge & Davis 16"x5'; 4 Atlas 10"x24"; South Bend 9" bench and 2 Porter-Cable Production lathes. TURRET LATHES:—2 Garvin No. 2-1" cap.; P&W No. 1½-1"; 2 P&W No. 2-1" and No. 4-1½" W. & S. MILLING MACHINES:—Van Norman 22LU fully equipped; B&S No. 2 universal; Kempsmith No. 3 plain; Bridgeport vertical; Becker No. 2½ plain; B&S No. 1 plain; Garvin No. 2 plain and Whitney No. 6 hand miller. GRINDERS:—B&S No. 1 universal; Van Norman No. 2 universal; P. & W. internal; Reid No. 2 6x18" surface; Robot 6x18" surface; LeBlond No. 1 universal cutter grinder; Cincinnati universal cutter grinder; Cochrane-Bly cutter grinder; Ex-Cell-O carbide tool grinder; DRILL PRESSES:—Allen 16" ss; 2 Atlas 14" ss; W. K. Knight No. 1 precision; Allen 16" 2-spindle; Prentice 20" ss hd; 2 Allen 2-spindle; Prentice 3-spindle; 2 Delta ss; Dwight-Slate 2-spindle; Leland-Gifford 4-spindle; Prentice heavy duty ss; Barnes heavy duty ss; 2 Tuttle ¼" tapping machines. SHAPERS:—Whitcomb 24" and P & W 14". PLANERS:—Whitcomb 16x36"; P & W 14x36" and Shepard 24x72". MISCELLANEOUS:—2 No. 8 Standard presses; No. 1 Lapointe broaching machine; Doall contour saw; 2 Kalamazoo band saws; Cochrane-Bly cut-off saw; Economy heat treating furnace and a complete Inspection Dept.

H-47—Connecticut plant has following available:—South Bend 9" bench lathe; 2-Atlas 10" bench lathes; Prentice 14" engine lathe 6' bed; Atlas drill press and Van Norman cylindrical grinder. Owner has had 10-years' experience making jigs and fixtures and is capable of reading complicated blueprints, estimating costs, setting up, etc.

H-46—Designers and builders of special machinery, tools and dies in New Jersey with facilities for pressed sheet metal, wire and screw machine products, have the following equipment available for subcontract work:—20 lathes, maximum capacity 24" swing x 24' overall; 28" swing x 10' overall; the rest vary to a minimum swing of 12"x3' between centers, including 3 new bench lathes; 5 millers including Cincinnati plain No. 2, Cincinnati universal No. 3, Garvin universal No. 1½. Becker-Brainerd plain, Bridgeport vertical turret head miller with attachments (slotting, etc.); 4 shapers—2 of 14" stroke, 1 each 15" and 16" strokes; 2 planers, Whitcomb 36" between ways, 26" clearance, 10' table, 22" between ways, 18" clearance x 5' table; new M3 Abrasive surface grinder; Norton universal grinder for internal and external work; Dumore toolpost grinder with quills and attachments; Niles-Bement No. 346 horizontal boring mill—bores up to 8"—52" travel; Doall contour saw model ML; 15 drill press including new Delta 2-spindle and 2 radials with 3' arm; complete welding department; metal stamping department with 4 power presses equipped with automatic feeds; supplemental machine shop equipment including filing machines, power saws; full complement of precision measuring instruments to work to tolerances of .0002". On order for prompt delivery, Carroll-Jamieson 16" geared head screw cutting engine lathe, 10' bed.

H-45—Texas Service Parts Plant now engaged on some A-1-A work has some additional hours available on the following machines:—Landis 16 x 38" and 12 x 38" external cylindrical grinders (tolerance .0002"); Heald Model 50—18" spindle internal grinder (tolerance .0005") and Van Norman 8 x 24" external grinder (new—tolerance .0002"). No lathe facilities. Can do a real job on the equipment listed, and the management is eager to deliver.

Reducing Absenteeism

Executives, labor-management committees and plant medical staffs are recognizing the importance of health and physical fitness programs in an effort to reduce absenteeism among industrial workers.

An effective means adopted by some of the nation's largest plants to combat such absence is the distribution of vitamins in capsule form to plant employees.

It is reported that not only has absenteeism been curtailed by the use of vitamins, but in many cases increased production efficiency has been accomplished. A large manufacturing plant, for example, suffered a relatively high percentage of rejections of parts and examined its workmen for vitamin deficiency. Specific treatment over a period of several months resulted in a reduction of as much as 75% in the number of pieces rejected. For one person, the average percentage of rejections was 1.7% prior to treatment. Four months later it had dropped to 0.2%. The workmen also reported much greater eye comfort, and in many instances were improved in general health.

Hermetically sealed capsules containing the daily requirement of all known vitamins necessary to maintain normal health are recommended for industrial use. These are packaged in bottles of 100, or in bulk containers with larger quantities. Full information regarding the use of vitamins in industry may be obtained by writing Cincinnati Vitamin Co., 1511 Madison Road, Cincinnati, Ohio.

Heatbath Book

Penetrate, Phytanium-Blended Finish For Steel, 20-page book just announced by Heatbath, Inc., Springfield, Mass., is said by the firm to be the first fully detailed, complete information on the process made available to the trade.

Booklet describes the process, said to apply protective, penetrating finish to steel, brought about at low temperatures thru chemical action on steel surfaces by the laboratory-controlled formula.

Resultant finish is claimed to be durable, rust resisting, attractive, and to impart friction-reducing qualities.

The book gives results of various practical tests and details equipment and apparatus available for application of the process to a large variety of products.

Ideal 25th Anniversary

A new 3-color brochure by Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill., Machinery Products Div. marks the company's 25th year. Booklet reviews the company's line of machine tool accessories which, during its life, thru research and close contact with the problems of the industry, have been continuously developed and improved, it is stated.

Illustrated and described in detail are Ideal live centers, metal etchers, demagnetizers, wheel-dressers, balancing ways, variable-speed pulleys, etc. each, it is said embodying distinctive developments in design and construction aimed to advance efficiency, economy and production.

Genesee Issues Condensed Catalog

A convenient 6 x 9" condensed catalog covering its complete line of cutting tools is offered by Genesee Tool Co., Fenton, Mich. Only 5 years old, this company has grown to be an important producer of cutting tools in the middle-west. The catalog not only illustrates and lists sizes of standard tools available but also shows a large number of group photographs of special tools which the company is equipped to produce.

The catalog also contains a number of useful tables covering standard items such as standard keyways for cutters, dimensions of Morse and B & S taper shanks, weight per inch of round bars, etc.

Both tungsten carbide and H. S. S. cutting tools are produced by Genesee.

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ing Tolerances; Aircraft Sheet Stock; Aircraft Rivets and Rivet Information.

Instructions and drawings are given on 10 Primary Riveting Jobs:— (1) Driving AN 430-AD-4 - ? Rivets (Roundhead); (2) Drilling Off Rivet Heads; (3) Drilling Exercises; (4) Driving AN-455-AD-4-? (Brazier Head) Rivets; (5) Driving NAF 1009 Rivets (Countersunk Heads) (Dimpling Rivets); (6) Driving NAF 1009 Rivets (Flush Rivets); (7) Driving Rivets on a Countersunk Curved Plate; (8) Use of Offset Rivet Set; (9) Blind Riveting; (10) Test Plate and Sub-Countersinking.

The book has 32-pages, 8¼x10-¾" and is bound in a substantial heavy paper cover. There are many illustrations and the text is condensed.

Aircraft Riveting

The Fundamentals of Aircraft Riveting are presented in a new publication issued by The Bruce Publishing Co., 540 N. Milwaukee, Wis.

The author is George E. Tabraham B. S.; M. A., Supervisor of Aeronautical Activities, Detroit Board of Education, and the price is 50 cents.

Explanatory chapters cover:—Stick-Thru Allowances; Dimensions for Buck-Tail Rivets; Countersunk Rivet-

Book on Priorities

WPB, Division of Information, has just released an 84-Pg. booklet, thoroly covering the subject of Priorities And Industry. Starting with the overall pattern, the work goes thru 6 chapters and 5 appendices, giving all regulations and interpretations of many of the most important. Contained, also, is a list of all priorities field offices, regional directors and district managers. Copies are available from WPB.

George E. Sanford, chairman of the general safety committee of the company, who made the announcement, added that the first quarter of 1942 shows a 50 per cent improvement over the same period of 1941.

Lowest year on record was 1940, with no fatalities and only 0.26 days lost per 1000 man-hours. In 1941, including four fatalities for which the safety record is charged 6000 days each lost in accordance with national regulations, the severity rate was only .50; for the first quarter of this year it has dropped to .30 days per 1000 man-hours. Accidents are charged against safety record on a prescribed basis, the loss of a hand costing 3000 days, one eye 1800, and so on.

The total number of lost-time accidents, for the first quarter of this year, is only 5.57 per million man hours worked, or approximately one accident per million hours more than the lowest on record—4.29 in 1939.

Only two occupational fatalities have occurred this year—and one of these was not while the employee was at his regular work, but while he was on his way from one building to another. Previous to this G.E. ran up 138,000,000 man-hours without a fatality.

"Safety"

Despite the fact that General Electric Co. has more than doubled manpower in the past 2 years, and has taken on thousands of employees without any previous experience in factory work, the number of days lost due to accidents in 1941, per 1000 hours worked, was the 2nd lowest of any year on record.

The firm can well be proud of such achievements.

Conservation

Enough aluminum to build 10 army bombers is reclaimed every 30 days from machine shop leftovers, according to W. J. Laird, head of the Westinghouse Reclamation division, Linehart works.

Of the 1,180,000 lbs of non-ferrous metals reclaimed last month, aluminum accounted for 120,000 lbs. This economy program conserves materials needed in national defense, saves Westinghouse money and helps maintain increased production. Reclaimed metals include aluminum, copper, aluminum base alloys, recovered from machine shop remnants shipped from various Westinghouse plants.

After pure aluminum and copper are removed from the metallic mixture, remainder is divided into about 50 alloy categories. Placed in a revolving bucket, a batch is thoroly mixed and tested to determine exactly what metals it contains and how much of each is present. To get the right percentage of metals that for a specific alloy, various amounts of pure metals are added and mixed with the reclaimed.

Gas furnaces resembling huge tea kettles are the melting pots that blend the metals together. Up to 20,000 lbs at a time can be crammed into each furnace, fired at regulated temperatures ranging between 1800-2300° F, and poured into molds to form 100 lb ingots. Tested again by chemical analysis to establish the metal content of the alloy, the ingots are assigned identification numbers. The metal then is ready for use at Linhart works in making various types of castings.

Progressive Exhibit at Metal Show

To be exhibited for the first time at the National Metal Show in Cleveland, Oct. 12-16, is Progressive Welder Co's., spectacular new "Temp-A-Trol" welder, "the machine that thinks for itself," designed for the welding of heavy section alloy steels, etc. The machine, now in quantity production, departs radically in operation from conventional spot welding practice in that the temperature at the weld is used to control the machine rather than the customary cut-and-dry regulation of current and time.

The second important feature made possible by this device is that the weld itself and adjacent areas can be heat-treated and tempered, etc.—immediately after welding—without removing part from between electrodes.

In addition to the new "Temp-A-Trol," Progressive Welder will also exhibit welding guns designed for fabrication of aluminum and aluminum alloys, stainless steel, etc.; the new "Revers - O - Charge" condenser discharge control for aluminum welding; a new Rocker Arm welder designed specifically for the welding of aluminum; etc.

It is understood that the new "Temp-A-Trol" welder will be exhibited in actual operation at the Metal Show.

Honing and Superfinishing Stones

A 4-page folder citing the advantages of uniformity of hardness and grain structure in honing and superfinishing stones was published recently by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit, Mich. The folder, in reality, is a revised, up-to-date edition of a similar folder issued by the same firm several years ago. Printed in gold and blue and handsomely illustrated, it features the company's well-known Micro Bond honing and superfinishing stones. The back cover contains a chart to be used as a guide for the selection of the proper stones intended for use on steel of known hardness.

Not many years ago, interchangeability of parts was considered an expensive undertaking, limited only to the manufacture of products in exceptionally large quantities. Today, however, thru close study of manufacturing methods, almost any type or style of product can be made interchangeably, even tho the output may be considered relatively small.

During the past few years, management has learned to realize that tool engineering is the 'backbone' of successful manufacture. Not so long ago, however, some executives were not too familiar with the so-called hidden advantages of 'tooling,' and looked upon special equipment as some kind of unnecessary overhead that merely cost a lot of money. Today, the picture is quite different. Tooling has become of vital importance, and management realizes how necessary it is to tool-up adequately to meet production demands within stipulated costs.

Those engaged in the field of tool engineering know, perhaps better than anyone else, that tooling cannot be valued by its cost, Curtis said. Cost is a factor, of course, but performance is what counts and what must be attained if our tooling is to be successful.

Explains Tool Engineering

Tool engineering has had enormous effect upon nearly every phase of the advancement of civilization, Frank W. Curtis, Van Norman Machine Tool Co., past president ASTE, recently told the association. The cost of automobiles, refrigerators, radios, and many other products, said Curtis, would have been far beyond the reach of the average man if it were not for the science of tool engineering.

Bear Dy-Namic Balancers

War Production is hastening adoption of Dy-Namic Balancing to eliminate noise and premature wear of shafts, bearings, etc. resulting from excessive vibration of rotating parts caused by couple action. Bear machines make this new technique available to every manufacturer and maintenance concern requiring Dy-Namic Balancing for either products of their manufacture or for their own production line machinery, motors, etc.

Bear Balancing Machines are claimed to indicate the disturbing centrifugal force or force couple with a high degree of accuracy. Both angular position and value or amount of unbalance are shown at the same time. It is unnecessary to static balance before a Dy-Namic Balance test can be made. The machine reveals whether a static or Dy-Namic unbalance, or both, are present without reversing ends of body being balanced.

Machines are available in a variety of models ranging from bench models to large floor and pit-type models for balancing such rotating parts as armatures, fans, blowers, fly-wheels, hubs, drums, propellers, gears, impellers, pulleys, wheels, rotors, etc. weighing from 6 ounces to 1000 pounds.

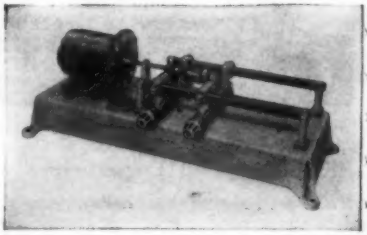


Illustration shows the new Bear Bench Model 335 for Dy-Namic Balancing of small parts, weighing from 6 oz. to 20 lbs. Catalog containing complete line and data relative to the Bear Dy-Namic Balancing Technique is available. Address the Bear Mfg. Co., Industrial Div., Rock Island, Ill.

Conversion

Steel turbine spindle shafts for naval vessels are now in production at a plant of the Pittsburgh Plate Glass Co. under subcontract from the Steam Division of Westinghouse Electric & Mfg. Co., according to L. E. Osborne, Westinghouse vice president.

In the effort to speed production of this vital war equipment, more than $15,000,000 worth of subcontracts have been placed by the Steam Division, where turbines and gears for naval and merchant vessels are built.

Spindles are the "heart" of a war vessel's power plant. They are the spinning hubs to which multiple rows of blades are fitted, to utilize the energy of high - pressure, high temperature steam, which causes the spindle to revolve and thru speed reduction gears, turn the propeller.

The glass company's normal production of flat glass of various kinds calls for large-sized lathes, used to keep huge forming rollers in working condition. With the assistance of Joseph C. Bohan, manufacturing engineer of Westinghouse as a consultant, Pittsburgh Plate Glass was able to convert these lathes and retool them to operate at the extremely close tolerances needed for machining the intricately-shaped turbine spindles. Westinghouse also supplied many of the special tools required for the task.

Tolerances as fine as 1/10,000th of an inch are common practice in the production of such marine propulsion equipment, which must be built to stand up under almost continuous operation over a wide speed range in the exacting job of driving Navy's men-of-war.

Flame Hardening Machine

A Flame Hardening Machine is announced by Hydraulic Machinery, Inc., 10421 Grand River, Detroit, Mich. Base and external housing structures are of welded steel design . . . Electrical control and hydraulic power as a motive source are said to provide positive and flexible operation. Parts that require adjustment and routine maintenance, viz., pilot light, burners and water coolant are on the outside. These are located on the rear slide. Proper shielding directs the flame and the water to the exact surface required, assuring uniform results. Working parts are adequately shielded from the heat, in the machine proper, preventing chances of distortion and misalignment. Water is used as a quenching medium and it is completely sealed from the actuating mechanism. Sprocket or part to be hardened is manually loaded onto the index table, the pilot positioned with a locating pin and after the start button is pushed, the machine goes thru its complete cycle, stops and is manually unloaded.

Silver Resists Corrosion

Contrary to general impression, silver does not oxidize readily at ordinary or even at fairly elevated temperatures, and when the oxide is formed it is not stable. Heating the oxide results in freeing oxygen and reversion of the silver to its pure state. A sulfide film is readily formed in atmospheres containing sulfur, and results in the tarnishing sometimes referred to as oxidation. The sulfide film, however, has high electrical conductivity and is not a serious detriment on electrical contacts.

Silver is also highly resistant to many forms of chemical attack referred to as corrosion and for this reason is extensively used in lining containers and other equipment employed in the chemical and food industries, among others, not forgetting the important photographic industry, the acetate rayon industry and the dyestuff industry. Condensing coils contacting with acetic acid of all strengths have shown no deterioration in fifteen years. Even aqua regia, which dissolves gold and platinum, has little effect upon silver beyond forming a protective chloride film upon the surface of the metal.

Silver is used in the beer industry, as contact with silver does not change the color or flavor of beer. Distillers of essential oils employ silver lined pans, coils and taps. A protective silver fluoride coating is formed on silver in contact with fluorine, but recent investigations have shown that silver is not attacked by aqueous hydrofluoric acid. Use of silver for handling both wet and dry chlorine is common in filtration plants.

Honing 26" Cylinder Bores

In the days before the safety razor, honing a true edge on a sharp razor blade was a familiar and exacting task. Fine precision was required.

To obtain still greater precision in constructing gasoline and Diesel engines, some manufacturers have been honing the inside surfaces of the engine cylinders. This became the practice about 10 years ago.

Since its inception, honing of cylinders has been confined to the smaller sizes. To apply this process to some of the larger engines is a first-class engineering job.

The Cooper-Bessemer Corp., manufacturers of Diesel engines, has erected a machine in its Mount Vernon (Ohio) plant which will hone a cylinder with a bore as large as 26" and up to 6 feet in length.

This is believed to be the largest vertical cylinder-honing machine ever constructed. Heretofore, R. L. Boyer, Chief Engineer says that honing has been confined to cylinder bores under 16" in size.

The machine was designed and constructed by Cooper-Bessemer tooling engineers and craftsmen because it could not be purchased at this time. It stands about 20 feet high and just clears one of the overhead cranes.

In explaining need of such a machine, Boyer pointed out that there are 3 methods of finishing engine and compressor cylinders, namely:—boring, grinding and honing. The Cooper-Bessemer Corp., has had equipment for finishing cylinders by all 3 methods.

From their experience, it has been found almost impossible to maintain the required tolerances on the bores of the cylinders by boring. This is particularly true on 2-stroke cycle power cylinders with ports because on these cylinders the cut is intermittent.

Grinding of cylinders above a certain size is also quite a problem because of the overhang of the grinding wheel on the spindle.

Honing of cylinders has been found to be the most satisfactory method of finishing because honed cylinders have a truer surface than cylinders finished in any other way; and extremely close bore tolerances can be maintained by honing.

It is believed to be the first time that an electric control has been applied to this type of machine. The simplicity of operating is illustrated by the fact that an operator with only 1½ years' experience in the machine shop learned to operate this new machine in a few days.

Ampco Metal Booklet

Illustrative of applications of its product in meeting demands of warplane construction and modern flight conditions, new booklet by Ampco Metals, Inc., Milwaukee, is announced. Featured are non-magnetic parts for plane windshields, precision-machined engine parts, propellor parts, etc. The firm claims steadily growing appreciation of its product's high physical properties, and the booklet is purposed to point the way to increased range of uses of the metal by American industry.

Rust Protective Wrapping

Rust, dust and corrosion are silent, powerful enemies of a smoothly running war machine. They are particularly damaging if they can attack before parts are finally assembled and the weapon, instrument or vehicle put to use.

Therefore, these enemies must continually be guarded against during fabrication and shipping of ammunition, guns, range-finders, tanks, planes, and spare parts. Traditional proctector against rust-inducing moisture has been a layer of thick grease, but it takes far too much time and labor to remove the grease, as any World War I soldier who was presented with a grease coated rifle well remembers.

To save valuable man hours otherwise spent in such cleaning operations, a number of plants engaged in war equipment work now use a new tough, moisture-proof wrapping material. It is made of Du Pont cellophane film laminated to a light, cotton fabric known as scrim and then impregnated with other moisture-proof materials. It can be sealed either by twisting the ends of the package by hand or by using a heat-sealing device. The cellophane adds strength and helps make the material oil and acid resistant. The wrapper was developed by the Dearborn Chemical Company, of Chicago, and comes in several types and thicknesses.

Buy United States War Savings Bonds and Stamps

Press Brakes and Their Uses

An attractive and helpful 64-page treatise on Press Brakes and their uses has been published by The Cincinnati Shaper Co., Cincinnati, Ohio. For the most part it is devoted to illustrations showing typical press brake applications, bending and punching load charts, features for special work and numerous pages of dies and their uses.

The book really is a very complete manual on modern press brake practice. It is unusually timely because of the increasing use of these machines in sheet metal fabrication in the manufacture of combat tanks, planes, ships etc. Many forming operations are shown in detail—also progressive forming operations, straightening armor plate, corrugating and curving, notching and forming, punching, trimming and embossing. Details of the use of micrometer adjustment gauges are given; also fixed center and adjustable punching equipment. Acute angle and flattening dies are discussed and illustrated; also dies for 90° and offset bends, as well as four-way and radius dies, U-bend, beading, wiring, channel, seaming, box and other dies.

The book contains many large scale pictures and drawings, and there is not too much text. It presents a wealth of valuable information for any technical library and is a credit in every way to its sponsors.

GET YOUR ANSWER AT *America's War Conference on Metals!*

War has developed new products, new production equipment and new ideas. All of these aids to greater production will be shared when the metal industry meets for the 24th year at the National Metal Congress and a War Production Edition of the National Metal Exposition, the week of October 12, in Cleveland.

Here is your opportunity to discuss your problems with other leaders in the industry. It is your opportunity to see what war metals are adaptable to your production, to study the best in equipment and supplies, to learn how other plants are meeting their war problems.

This is your opportunity—and your responsibility—to help your industry carry forward its giant task of winning this war of metals. You may listen to as many as 100 technical papers presented by the four great cooperating societies. You may attend the numerous war production conferences. You may consult with manufacturers' experts in more than 230 educational displays. Plan to attend this great war conference on metals.

● *Display Space Still Available—more than 230 manufacturers have reserved 89% of the display space available in this 100% educational meeting If you serve the metal industry, reserve your space now and put your technical experience and information on the war production line, where it will do the most good today.*

TIME

OCTOBER 12 TO 16, MONDAY THRU FRIDAY

PLACE

CLEVELAND'S PUBLIC AUDITORIUM

EVENT

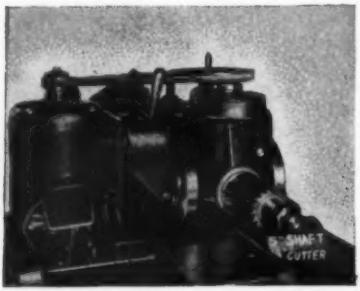
THE NATIONAL METAL CONGRESS AND WAR PRODUCTION EDITION NATIONAL METAL EXPOSITION

THEME

INCREASED PRODUCTION OF WAR PRODUCTS

Brauer Universal Shaper-Mill

Any shaper, 20" or over, may be converted into a versatile milling machine with a new shaper-mill developed by the Brauer Machine & Supply Co., P.O. Drawer 1469, Oklahoma City, Okla. The conversion may be made speedily for it involves the mere bolting of the attachment to head of shaper ram.

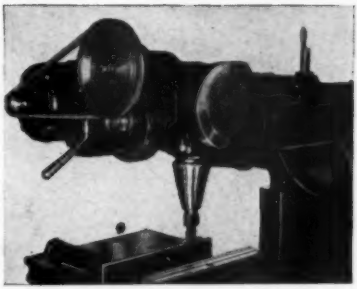


The mill is equipped with spiral bevel gear drive (4:1 ratio on main drive gears) and has roller bearings thruout. Compound gearing is obtained by 2:1 ratio helical gears—large gear is of fiber composition with steel pinion. Spindle runout is guaranteed less than .001".

Twelve or more spindle speeds of from 60 rpm to any speed required may be obtained by interchanging pulleys, 2 pulleys being supplied for the motor and 3 for the mill.

The mill is easily fitted to different sizes of shapers since the adapter cradle is first rough-machined and then machined to fit the shaper ram on which it will be used. This is a simple turning operation.

In attaching, compound head is removed from shaper ram and the mill bolted in place with 2 bolts. Shaper stroke is set on zero, and the tool-spacing screw in ram is used to run ram in or out. Then ram is locked in position with set screws behind ram gib. Shaper is then run to operate cross-feed. Operation is that of an ordinary milling machine.



Light weight and compactness make the shaper-mills especially useful for shops on ships or for portable shops having shapers available. Also to release milling machines for other work.

The units handle any type of milling work. Spindle bore is No. 4 Morse taper with socket for end mill work, (taking end mills up to 1½") and for 1¼ and 1" arbors for ordinary milling.

Spindle is of chrome nickel steel and has large roller bearing in front with 2 roller bearings in back of shaft. Latter bearings are 8" apart with cutter 5" from front bearing. Machine may be turned for milling thru an angle of 90°, and may be clamped in any position from horizontal to vertical. Motor and spindle are so arranged that mill can be used for grinding.

Motor arrangement is such that almost any single or 3-phase ball bearing motor may be used. Motor furnished is 1 hp, 1750 rpm, single-phase, 110 volts. Motor bracket has slotted base holes and motor stand is slid in or out to adjust belt position by loosening clamp handle. Motor is directly fastened to milling head and moves with head for angle work.

Raising Employee Morale

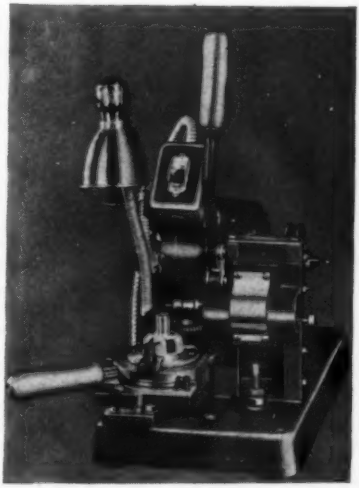
War Production Institute, with headquarters at 1991 East 66th St., Cleveland, Ohio, is distributing to war plants a sign created by the U. S. Government for the purpose of raising employee morale and increasing industrial output.

The sign is available to plants which are devoting 50% or more of their production to the war effort. It is printed on high grade banner sign cloth in brilliant red, white and blue. The dimensions are 48 by 72". It will last one year under normal conditions.

This sign has been used in a number of test cases and has been found to stimulate new effort and reduce slowdown tendencies among plant personnel. Experience has shown that the best places to mount it are in the shop where the worker can see it without moving from his machine, near water fountains, in factory training classrooms, in plant cafeterias, and in employee locker rooms.

Hand Miller for Small Parts

A new, light, inexpensive hand miller has been developed by H. D. Rouse & Co., 2216 North Wayne Ave., Chicago, Ill., thru experience gained in the machining of small parts, and is now being placed on the market.



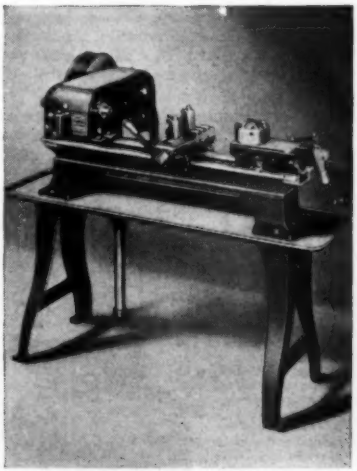
This is a high speed ball bearing, motor driven bench machine which is suitable for handling light cuts in brass, aluminum, and similar materials.

It can be used on small parts for radios, instruments, electric motors and devices, aeroplanes, and similar equipment. Thru the use of special fixtures developed for each particular piece, the machine is capable of very high production.

The spindle is adaptable so that either small circular milling cutters or small end mills can be used on the machine.

It is a versatile machine for small work where speed and ac uracy are essential.

Logan Turret Lathe



The Logan Engineering Co., 4901 Lawrence Ave., Chicago announces production of its No. 830 Hand Screw Machine which has a capacity of 5/8" round bar stock. This new lathe was developed to meet current day needs for a small fine tool capable of accurate and continuous production. The makers emphasize that because small parts made from bar stock of 5/8" diameter and smaller can be turned out with the same speed and precision as

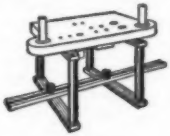
on larger machines, the latter can thus be released for heavier work. Features of design and construction include:—precision ground bed with 2 prismatic "V" ways and 2 flat ways; precision, pre-loaded ball bearing spindle mounting; turret holes are bored from the headstock; turret and cross slide are provided with adjustable gibs to compensate for wear. The entire machine is built to rigid and exacting specifications of the same high standards that have characterized all Logan Lathes. A new speed collet chuck for handling round work which may be fed thru the spindle and a bar feed attachment are offered as accessories.

Acro 3" Die Cradle

A new 3" Acro Die Cradle has been developed to handle smaller work sizes than the standard 7" Cradle now said to be widely used in tool and die rooms.

The manufacturer states that many requests for a smaller parallel unit prompted him to produce the 3" cradle to permit handling a wider range of sizes.

Like the 7" cradle, the smaller unit is said to be made of high grade steel, hardened and ground to close tolerances to insure a safe, accurate foundation for expert workmanship.



It is claimed that these cradles make tool, die and machining operations easier, faster and safer with better work as a result.

Complete details of the new Acro Die Cradle may be obtained from Acro Tool & Die Works, Dept. A, 5324 North Kedzie Ave., Chicago, Ill.

Hydraulic Drilvise Bulletin

A Bulletin has just been issued illustrating and describing the Drilvise, an automatic vise for drill press work, and other operations. The vise is hydraulic, entirely foot-controlled and operator's hands are wholly free for the work.

By foot-operated levers, Drilvise is said to give any holding grip from contact to more than 10,000 pounds. Foot pressure moves the rear jaw forward 3/16" at a time until required grip is obtained.

It is made by Studebaker Machine Co., 9 South Clinton St., Chicago, Ill.

Colloidal Graphite Booklet

A booklet, just released by Nassau Laboratories, Hackensack, N. J., consists of a compilation from case histories of hundreds of engineers and maintenance executives on the application of colloidal graphite lubrication to everyday plant maintenance problems. It is entitled, Plant Engineer's Handbook, and offered as a guide to increased war production.

It is thumb-indexed and covers applications covering a long list of items, which should be of interest to engineers and maintenance men, everywhere.

Electrical Blueprints

A new "how-to-do-it" book on the reading of electrical blueprints has been written by Gilbert M. Heine, Drafting Supervisor of Work On Electrical Controller Diagrams, Cutler-Hammer, Inc., and Carl H. Dunlap, Head, Electrical Engineering Dept., American School. It is published at a list price of $2.75 by the American Technical Society, 58th at Drexel Ave., Chicago, Ill. In preparation of drawings from which blueprints are to be made, it is the practice in the electrical industry to use symbols to represent certain objects instead of drawing the pictures. As blueprints are often an electrical worker's only source of information on the job, a thoro knowledge of the significance of these symbols is essential.

The electrical industry has many branches, because of the diversified character of the work performed and machinery used. Each of these branches uses symbols designed for the types of blueprints meeting its special needs. The text of the book has been written in sections, each dealing with the symbols used in its section. Thus, one section explains how to read blueprints for wiring buildings; another, diagrams of motors and generators, etc. The sections are arranged so that simple blueprints and diagrams are explained first, and the more difficult ones last.

A new method of presenting the symbols is used. Pages of symbols have been prepared with illustrations of the corresponding objects opposite the symbols.

Explanations are clear, and many fundamental circuits are shown with clear and concise descriptions.

Finishing Really Small Gears

Permitting rapid finishing to high accuracies of really small gears by the crossed-axis principle of gear shaving, a new finishing machine, the 861-4B is announced by Michigan Tool Co., 7171 E. McNichols Road, Detroit.

The machine, already in quantity production, is specially designed for finishing gears of less than 4" diameter and less than 1" face width. It is therefore particularly suitable for production of gears for instruments, control mechanisms, and similar precision devices in which high accuracy combined with correct tooth form, and minimum backlash, are essential to successful operation.

Designed for mass production, the new 861-4B is said to be notable for the speed with which gears can be finished to high accuracies. It is automatic in operation, with combination cam and electric control simplifying and speeding production.

In addition, machines are so designed that a number can be installed as a single battery, with one operator taking care of several machines, if necessary. For this purpose, working mechanism is located entirely in top casting (Fig. 1).

In operation, the gear which may be mounted on a specially designed mandrel or on its own shaft, is placed between dead centers with hard metal tips in the machine. A serrated-tooth rotary cutter, mounted on an axis at an angle to that of gear, engages and drives gear, first in one direction and then in opposite direction, to finish both tooth faces. During cutting action and infeed, cutter also reciprocates back and forth across face of gear, permitting use of narrow cutters. Both cutter cross-feed and infeed to correct center distance are cam controlled.

Fig. 2 shows a gear mounted on a quick-assembly mandrel. Tail stock at right is provided with a single handle, which not only pulls right hand center back for mounting of mandrel or gear in machine, but also serves in a single movement to lock and unlock this center. Center is so designed that correct predetermined pressure is automatically obtained. Machine is started by pressing a button on front. When gear is finished, machine automatically stops. Operator unlocks and retracts center with one movement of control handle, replacing gear with another one to be finished.

Machine is designed to permit the finishing of a wide variety and sizes of gears with a single cutter for each pitch and pressure angle.

While 16 is the recommended maximum pitch of gears to be finished, small gears of such pitches as 32, 48 and 64 have been successfully machined in tests on a production basis.

The machine is equally adaptable to finishing gears of stainless steel, carbon steels and non-ferrous materials including brass, bronze, fibre, etc.

Shaft mounted gears as well as gears to be mounted on mandrels may be finished. In the former case, of course, finishing the gear eliminates the effect of possible inaccuracies in concentricity between shaft and gear. Gears may be located at either end—or anywhere in between—on shafts up to 6" long, while maximum shaft length which can be accommodated between centers is 9". Cutter diameter ranges from 2 to 3" with maximum face width of ½". Minimum center distance between cutter and work of spindles is 1½", with a 4" maximum center distance.

Senacon Air Motors

Senacon is the trade name of a new line of air motors, complete with universal integral valves, for use wherever powerful reciprocating motion is required. As an auxiliary for application to machine tools, these motors save time in opening and closing vises and holding fixtures, operating clutches and latches, moving work pieces and tools to and from each other, and similar operations. In such applications, the valve lever can be linked to a moving part of machine for automatic synchronous operation, eliminating manual motions.

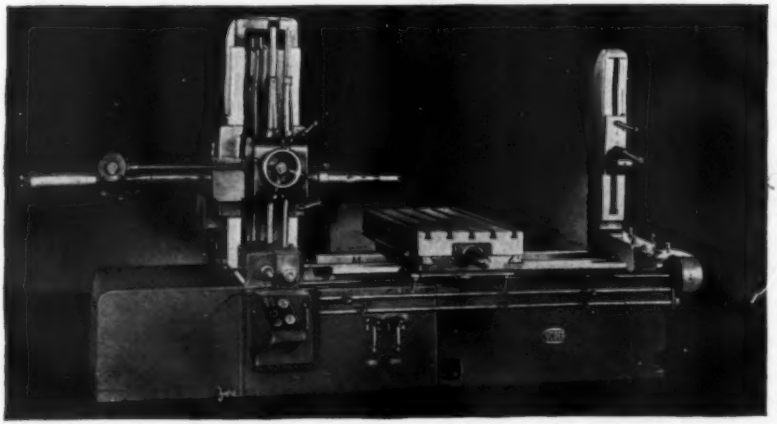
Another important function is as prime movers for supplying fractional horsepower for such operations as tube flaring, punching, broaching, stamping, die casting and bushing insertion. It is claimed that in some cases, production has been increased to as much as 400% by these motors.

A special feature claimed by the manufacturers is that dual exhaust ports provide for selective utilization of the exhaust air blasts for ejecting work pieces, cleaning out chips, and permitting adjustment of speed of one or both strokes.

Senacon Air Motors are available in 2 standard models with strokes of 1½, 2½, 6, and 9". Other sizes ranging from 1 to 18" are furnished on special order.

Descriptive bulletin will be mailed by Smith-Johnson Corp., 623 East 12th St., Los Angeles, Cal.

Yoder No. 3A Horizontal Boring Mill



This new machine is said to operate on a different power principle than heretofore customary. It has been used on other machine tools for sometime. It is adapted to a horizontal boring mill to give "Power Touch Control" in which touch and turn of the hand control replaces gear shifting levers. The other assortment of operations also is more easily performed.

An infinite number of speeds and feeds, are provided which may be obtained without stopping to shift gears. High acceleration and quick-dynamic stops are obtained without shock or strain to machine parts.

The maximum allowable amount of power is available at the tools. Feeds may be set to a maximum without limitations of step gears to get the most out of the tools.

Quick stopping.

Set - up speeds provide extremely slow but positive motion of cutters, tools and parts, while a man performs measuring and set-up checks without complete shut-downs on machine.

A 16 to 1 speed variation is provided on spindle and feed.

The Power Flow Drive is claimed to embody the advantages of a variable speed d-c system from an a-c source.

Torque output is said to compare favorably and to advantage over older types of drives and is applied directly without a large number of intermediate speed change devices.

Synchronized Vernier Scales are provided on head, column and outer support.

All hand adjustment screws are equipped with screw lock micrometer dials.

All controls are centrally grouped. Starting, stopping and reversing of machine and feed are controlled thru 2 bars running along front of machine. Control handles may be moved to the most convenient position. One man can easily set up a large job.

A 2-speed rapid traverse facilitates inching up to work at a slow rate and at a high rate when considerable travel must be made.

Main drive for spindle is direct from a motor, while feed drive is from another motor thru positive clutch drive.

Milling cutters and other attachments may be bolted directly to flange on outer end of spindle.

Infinite speeds are available up to a

maximum of 600 rpm on spindle and 100" per minute on feed for head, saddle and table.

Heavy multiple thread worm gear on spindle drive is said to eliminate noise and chatter.

All drive shafts are of best alloy steels obtainable, mounted on anti-friction bearings.

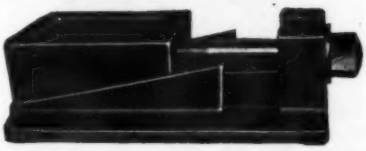
All drive and feed gears are high strength alloy steel, heat treated and provided with oil pump flood lubrication.

Tapered gibs are furnished on head, saddle and table.

Machine is made by The Yoder Co., Cleveland, Ohio.

Handy Machine Leveling Device

Sturdy and effective leveling jacks for the quick and easy leveling of machine tools or any industrial machinery that requires extreme accuracy of mounting, have been developed by Jurzek Machine & Engineering Co., 2305 Hilton Road, Ferndale, Mich.



The standard size jack No. 100A will fit most industrial requirements. It has a 6 x 9" base, average height 2-¾" and a top section 4 x 4-¾".

The illustrations show the extra large base and sturdy screw which contribute to permanent accuracy. The angular faces are accurately finished. Special sizes can be supplied on order and deliveries are prompt.

Milling Shell Staking Notches

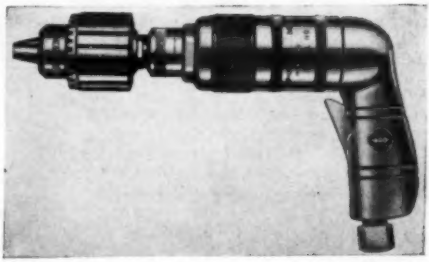
A new multiple spindle head for simultaneously milling a number of staking notches in shell noses is announced by Kent-Owens Machine Co., Toledo, Ohio.

The illustration shows a 5-Spindle Head which mills all 5 staking notches in a typical shell at the same time. This method multiplies production over the former method of milling one notch at a time. Both actual machining time and handling time are said to be reduced to a fraction of that formerly required.

The fixture shown is designed so that the shells are rolled on to it from an adjoining conveyor, completely notched, and then rolled back onto the conveyor.

This unit can be adapted for use on either a Kent-Owens No. 1-8 Machine with hydraulic feed to the table or the No. 1-M with hand feed to the table.

Aro 3/8" Pneumatic Drill



Addition of 3/8" capacity air drills, straight and right angle to their line of rotary pneumatic tools is announced by The Aro Equip. Corp. Bryan, O.

It is pointed out that these drills available at prices only slightly higher than this company's 1/4" drills, should be suitable for a wide range of jobs.

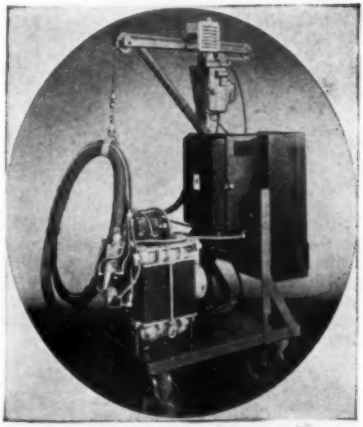
The concern makes an extensive line of small pneumatic tools for drilling, screwdriving, nutsetting, grinding, filing, polishing, sanding, paint mixing, and similar operations. These are described in its Catalog No. 42-A.

Low Pressure Welding Gun

When welding brackets or clips to light gauge alloy steels, light welding pressure is required in order not to deform the metal. A gun designed for such welding operations has been introduced by Progressive Welder Co., 3050 E. Outer Drive, Detroit.

Gun operating pressure is hydraulic with partially counter-balancing continuous air pressure. The latter also serves automatically to retract points when hydraulic pressure is released, thereby simplifying operation.

Features include screw-adjustable stroke (up to 3") to take care of a wide range of work sizes, and quick interchangeable adapters for electrodes to make gun suitable for a wide variety of work shapes. P-H concentric kickless and highly flexible welding cables and electronic controls are used in the complete assembly which is shown in portable form in Fig. 2.



Motor-Mica Bulletin

A new descriptive bulletin on Motor-Mica is available. It is 8½x11" in size, and is printed in 2 attractive colors.

According to the manufacturer, this new bulletin shows the many operations where Motor-Mica can be used

to help solve perplexing lubrication problems often found in stamping, drawing, turning, drilling, milling, threading, tapping, boring, die-casting, screw machine and many other operations. Moreover, detailed mixing instructions are contained in the folder to enable users to get the maximum benefit from Motor-Mica.

A copy of this new folder may be obtained by writing to Scientific Lubricants Co., Dept. J, 3462 North Clark St., Chicago, Ill.

Vernon Universal Tool Grinder

Machinery Mfg. Co., 1915 East 51st Street, Los Angeles, Cal., announces a new Vernon Universal Tool and Cutter Grinder. Several novel construction features are claimed to provide an exceptionally smooth and sensitive action. The Grinder handles all types of tools, cutters, cylindrical work, and internal jobs within its capacity.

Centers swing 10½" dia. over table. Maximum longitudinal travel is 17¼". Maximum work length between right and left hand tailstocks is 16". Maximum work length between headstock and tailstock is 13½". Maximum distance between centerline of work and centerline of grinding wheel spindle is 10". Transverse travel of column is 7½". Vertical movement of wheel spindle is 6".

Spindle head is powered by a ½ hp, 60 cycle, 3 phase, ball bearing motor running at 3450 rpm. The 2" OD spindle is mounted in anti-friction bearings and has a ⅝" shaft size at wheels. Internal spindle is of similar construction but is designed to take the higher speeds necessitated by smaller wheel sizes. 3 external speeds are provided and 2 internal speeds.

Of importance is the internal auxiliary drive, which is substituted for external spindle when doing internal grinding. Unnecessary wear on external spindle assembly is thus eliminated.

Grinding speeds are varied by changing motor pulleys only, for external spindle work, and by changing intermediate arbor pulleys only for internal grinding. This method of speed control eliminates possible "Brinnelling" of the precision bearings by thoughtless

tapping of pulleys in place on spindles. All connecting belts are well guarded as well as the external grinding wheels.

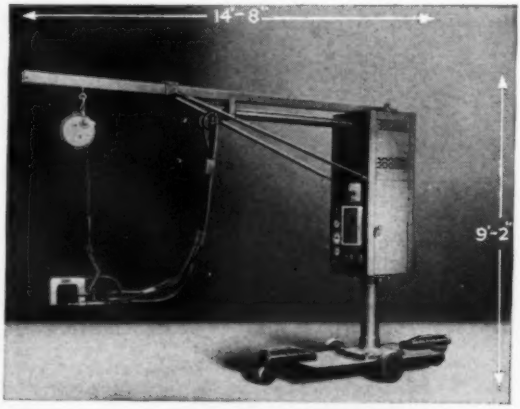
Spindle head swivels 360° on column in a horizontal plane and is provided with 2 suitable locks. A single control locks the column's vertical position.

Elevation is accomplished by rotation of a large hand wheel driving a 10-pitch 1¼" OD Acme screw. Screw is fitted to a special bronze nut which has a backlash adjustment, permitting accurate control of head at all times. Dial is graduated in widely spaced divisions of .001" and is adjustable for zero settings.

Many accessories are available. Standard equipment includes a universal tooth rest, plain head and footstocks equipped with No. 2 Morse centers, and a universal work-head. The universal work-head carries 2 internal tapers, No. 50 N.M.T.B. and No. 12 B. & S., and includes motor drive assembly with motor. Spindle is mounted in Timken tapered roller bearings and is driven at any one of 3 speeds. Drive is by means of Vee belt. Footstock is provided with a tension adjustable lever release. Both footstocks and work-head are symmetrical about center line and may be used at either end of table.

Two types of wheel dressers are also available. Bracket type, for face dressing, mounts on footstock housing and is standard equipment. Universal dresser, which will dress concave, convex, straight face and vee forms, mounts on table and is a standard extra.

Sciaky Radial Spot Welder



A radial-type gun spot welder, Model P-1-R, is now offered by Sciaky Bros., 4915 W. 67th St., Chicago, in both stationary and buggy-mounted units. It is equipped with a special Sciaky welding timer and operates on single phase a-c, 220 or 440 volts. Hydraulic pressure is supplied by a hydro-pneumatic booster, which can feed a gun able to supply a maximum electrode pressure of 1,800 lb with 90 psi of air supply.

Fixed or crowded jigs can be reached easily with the portable buggy-mounted welding gun (illustrated). The maximum area reached by the stationary unit is represented by a circle of 21 ft diam.

Secondary cables are thin, flexible and short; the reduction in the usual size of secondary cables is made possible because of the use of fixed heavy copper bars (water-cooled) in the length of the secondary circuit.

In steady production conditions, this welder is said to be capable of welding: —corrosion-resisting steel, pickled steel, zinc-coated steel and Monel metal in thicknesses of from 0.016 plus 0.016" up to 0.064 plus 0.064". It will also weld 2 unequal thicknesses up to a total welded thickness of 0.500" provided one of the two thicknesses does not exceed 0.040".

It is claimed that in welding pickled mild steel or standard steel, a speed of 180 satisfactory spot welds per min can

be attained on thicknesses up to 0.032 plus 0.032". Speed decreases as the sheet thickness increases.

Apco Mossberg Torque Wrench

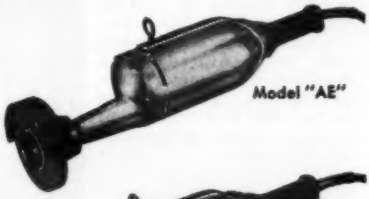
Instead of 2 dial sizes with calibration ranges either of 0-600 or 0-2200 inch-pounds, Apco Mossberg's new torque wrench is made in 4 dial sizes: —(1) a unit measuring 0-150 inch pounds of tension on an outside scale, first revolution—up to 250 inch pounds on an inside scale, second revolution; (2) calibration range 0-600 inch pounds; (3) range 0-1200; (4) range 0-2400 inch pounds.

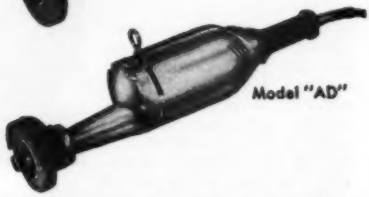
With four sizes of dials and the calibration range of each limited, dial graduations are larger, more widely spaced. This makes it possible to read them more quickly, easily—more accurately.

Mounting of the dial is also improved. Set in a special housing inside an extension of the handle, the makers emphasize that it's more rigid . . . better protected from bumps and shocks that might knock it out of adjustment. Operating accuracy is said to be guaranteed to 98%! The makers are Apco Mossberg Co., 114 Horton St., Attleboro, Mass.

Portable Grinders

Two new portable grinders have just been added to the extensive line of electric tools manufactured by Skilsaw, Inc., 5035 Elston Ave., Chicago. They are Model "AD" and Model "AE," 4" and 5" grinders respectively. Both are purposely introduced right at the peak of America's greatest production drive because both are especially engineered to meet today's high speed requirements on all grinding, wire brushing, polishing and buffing operations.





Both the 4" Portable Grinder, Model "AD" and the 5" Model "AE" contain every feature of advanced design and sturdy construction essential to maximum performance and adaptability to wide variety of applications. Ball bearings mounted in steel inserts on armature and extreme ends of wheel spindle absorb thrust, eliminate vibration and insure cool operation. Commutator and switch are fully enclosed for protection against dust, and straight-line ventilation blows dirt away from operator and prevents clogging. Steel gears, heat-treated for long life and spline-mounted on shafts, are both strong and quiet. Powerful universal motor assures full efficiency under load. Rubber sleeve handle provides a firm, cool, non-slip grip.

Model "AD" Portable Grinder is 22" long, weighs 15 lbs., operates at no-load speed of 4500 rpm, driving a grinding wheel 4" x ¾" x ½". Model "AE" has a grinding wheel 5"x¾"x½" and operates at 4200 rpm. Weighs 18 lbs. and is 22⅝" long. Both models assure top production on all metal grinding and metal cleaning operations in war plants of every type.

Welding with Remote Control

Hobart has developed a new remote control unit which is now a standard production feature of all welders offered for sale by the company. This improved control is protected fully from accidental breakage by a metal pull-out handle set over the control dial and by cushion springs on back of the porcelain rheostat.

The new dial, it is believed by the makers, will increase weld qualities—especially welds made under modern high speed techniques. It is well known among operators that for best results, welding heat should be increased somewhat when using coated electrodes in changing from flat position to vertical or overhead positions, and vice versa. Operators are only human, however, and with many there is a temptation to "get by" without changing machine adjustment because such changes involve repeated trips between work and machine.

With remote control, this condition does not exist, because it places 100 steps of fine volt-amperage adjustment right within reach of the operator's hand. The remote control unit is easily set up by using an ordinary lamp cord extension to connect it to the machine.

In practice, some operators have learned to weld continuously with one hand—making heat changes with the other without even breaking the arc. On other applications, it is often possible to change electrode sizes and adjust the heat to meet weld conditions without going near the welding machine.

Even in factories, where machines may be located comparatively near the work, use of the remote control feature has been found effective in speeding production and improving weld quality—especially in the elimination of weld craters. On other jobs, welding machines may be compactly located near the ceiling to conserve floor space, while operators located below the machines use remote control for fine current settings.

The large outer control dial shown, is the field rheostat which controls the differential compounds—while the remote control unit adjusts the open circuit voltage. It is said 1000 combinations of voltage and current are possible with this Multi-Range Dual Control Dial, full details of which are available from Hobart Bros. Co., Troy, Ohio.

"Master Tri-Square"

A Master Tri-Square, said to be held to limits hitherto unattained, has been produced by the Jansson Gage Co., 19208 Glendale, Detroit.

Of one-piece solid construction, it is suited to extreme precision measurement wherever 90° angles are involved. Held to limits of .00002" base and side, the Master Tri-Square is available in 2 sizes:—4" in height with a ⅝" wide standing base and 6" with a 1" wide base.

The Square is hardened, ground and lapped from alloy tool steel—final manufacturing operations being done in a

special temperature control room to assure maximum gaging accuracy. It is provided with an inset hard fibre serrated grip to prevent heat transference and to prevent slipping in handling which might cause damage to the Tri-Square. Vertical side edge is knife-sharp for truer visual gaging.

The Master Tri-Square is a basic gage for inspection departments, rounding out any set of inspection tools. It is used in laying out and checking right angle work and square surfaces; and the checking of V's, straight flat edges, and parallelism of cylindrical surfaces.

Houghton Oils Book

With increasing burden and responsibility thrust upon lubricants that must protect machines operating 24 hours a day, 7 days a week, fortification of lubricants by scientific processing looms more importantly than ever before. This topic is subject of a booklet, featuring its MIH series of hydraulic oils, just announced by E. F. Houghton & Co., Philadelphia, since 1865, pioneers in industrial lubrication.

Claimed for the firm's Hydro-Drive MIH hydraulic oil is increased oxidation stability, developed specifically to overcome weakness inherent in many such oils. The improved product is said to: (1)—Increase resistance to effects of pressure, heat, moisture, agitation. (2)—Possess marked solvent ability, tending to prevent deposits of sludge. (3)—Protect parts with a film claimed to be considerably stronger.

The book gives numerous instances and illustrations in support of claims for the improved product and is offered to interested owners or operators of hydraulically-controlled machines.

Aligning Coupling

Claimed to permit misalignments of as high as 3° on either shaft, or a total misalignment of 6°, Barcus Aligning Shaft Coupling is announced in a brochure available from Barcus Engineering Co., 3941 Falls Rd., Baltimore.

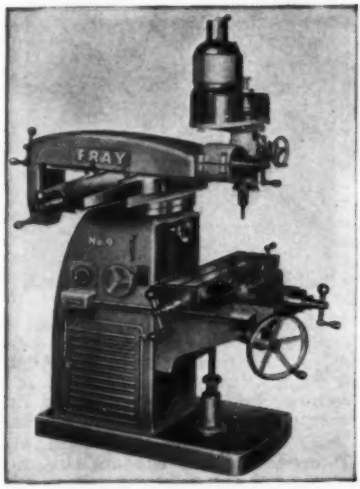
Internal gears have stub teeth with 20° pressure angle, and are cut on a true central segment of a sphere, surface teeth being of constant width thruout their length. Meshing into stub teeth of housing, produces smooth, ball action, contributing toward reduction of friction and pressure on shaft bearings that are out of line, says the announcement.

Liberal compensation, it is claimed, makes the coupling adaptable to many severe applications such as in many marine and nautical jobs, where vibration is a serious problem.

Production, according to the firm, has attained good volume for aeronautical and general machine operations.

Fray Horizontal-Vertical Mill

The issuance of a new folder on the Fray Number 9 Horizontal and Vertical milling machine is announced by the Fray Machine Tool Co., 501 W. Windsor, Glendale, Cal. The folder completely describes the machine, which is an all-purpose milling machine particularly suited to tool rooms and other shops having a wide variety of operations to perform. Practically any operation, at any angle or compound angle, can be handled, since the machine combines both horizontal and vertical milling machine functions.



For horizontal milling, the turret head is reversed and the vertical attachment swung back out of the way. Then the machine becomes a Number 2 horizontal milling machine, equally suitable for toolroom or production work.

Milling, drilling or boring operations can be done at any angle, longitudinally by traversing the ram on the turret slide, or crosswise by operating the ram in its saddle; these 2 movements when used in conjunction with the head, which can be set to operate at any or both angles, provide a wide range of operations. The ram has a cross travel of 10" and a longitudinal travel of 18". The Type E head is normally furnished with the Number 9 machine, and the motor may be swung completely around the housing and locked at any point. An instant change can be made from micrometer wheel feed to hand - lever feed. Spindle travel is 4", fitted with either No. 9 B & S or No. 3 Morse. The horizontal spindle is National standard No. 40 taper.

Cross travel of table is 9", with a longitudinal travel of 20". Working surface is 9½" by 36". Vertical travel of table is 16".

Motor for the vertical head is a Frayco unit of 1 hp; with a Frayco 3 hp motor in base for horizontal spindle.

Export Dictionary

New Commercial - Technical Dictionary, Spanish - English, By Antonio P. Guerrero; Chemical Publishing Co., 234 King St., Brooklyn, N. Y., DeLuxe Edition, thumb-indexed, Morocco finish, flexible binding, Lettered in gold. Full-tinted edges. 1942. Postpaid, $10.00.

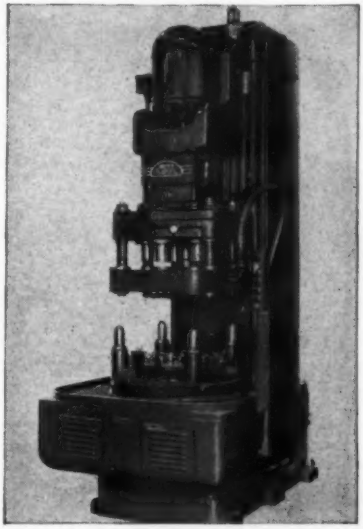
Extensive changes have occurred in the Spanish language as with virtually all others, within recent years, making this work very timely, with its many new words not in existence some few years ago. Each has been carefully translated in accordance with the Royal Spanish Academy of Languages, and painstakingly checked and verified. The volume has especial value and significance for the technician and engineer, since it was compiled by a prominent Spanish engineer.

Included have been all needed modern terms and words referring to Mechanics, Mechanical Engineering, Aircraft, Shipbuilding, Marine - Naval terms, Industrial Chemistry, Plastics, Meteorology, etc.

The publishers claim for the book a breadth and scope never before attained within a Spanish-English dictionary.

Given, also, are conversion tables of weights, measures and moneys alongside of the literal translations.

Standard Drilling Machine with Special Equipment



Snyder Tool & Engineering Co., Detroit, builders of high-production special machines for many purposes, also build a standard drilling machine in which many features of "special" machine performance are included, altho the cost is said to be about half that of a special machine of equal usefulness.

The unit shown is the 10-V-18 general utility machine. Capacity up to 15 hp, 1800 rpm for driving tools. Maximum stroke is 18" and opening between base and speed change transmission, (upon which, in this instance, a multiple head is mounted) is 36" minimum, 56" maximum. The maximum total hydraulic pressure feeding the hydraulic slide downward is 12,000 lbs.

Hydraulic oil is contained in a reservoir mounted on top of column and on inside of column are housed hydraulic pump, its motor, and counterweight to balance hand slide and multiple head.

This unit is equipped for hollow milling 20 bosses, using a 5-spindle head and the fixture indexes 4 times to complete the work.

The standard index mechanism provides the smooth acceleration and deceleration of the Geneva wheel, hydraulically powered from hydraulic system of the machine itself. The index table serves as a chip trough and coolant retainer.

This machine is available with or without special tooling and speed change transmission for single or multiple spindle adaptations. Only the equipment is special and it can be retooled for entirely different production by changing the special equipment only.

Machine is also available in size 20-V-16 with maximum 25 hp capacity for driving tools, 16" stroke and 19,000 lbs. total hydraulic pressure.

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What the Readers Say:

A Leading Machine Tool Manufacturer writes:

"I have just finished checking over the article by R. A. Reed, regarding 'Grinding Wheel Fundamentals' in your September issue. This article is exactly the thing needed in our educational program for new and green employees. It would seem to me that if you reprinted this in the form of a small pocket size booklet, plants from coast to coast would want quantities of them to distribute among their employees doing grinding. We could use 500 copies and perhaps more."

A War Production Board Executive says:

"Have noted your splendid cooperation with our efforts to secure salvagable metals which may be dormant in establishments of machinery plants. We greatly appreciate your interest and hope you will find ways and means from time to time to remind industrial plants of the critical need for scrap material."

The Ordnance Department writes:

"This office has copies of your Machine Tool Blue Book and we consider it indispensable in expediting for Ordnance contractors."

Here's What the Head of an Eastern Metal Fabricating Co., writes:

"Practically since the first publication of your Machine Tool Book, I have been receiving it and have been very much enthused over it. I have obtained some very helpful information from your book as to the methods of doing various jobs, where to buy machinery and tools and the editorial news."

An important Midwestern Tool Maker Says:

"We have been receiving your Machine Tool Blue Book regularly and find its contents interesting . . . interesting to such an extent that we would like to reproduce the picture page—'Mechanics Through the Ages' which appeared in the September issue for our plant house organ."

Western Screw Products firm writes:

"May we express our appreciation of the nice work you are doing on the Machine Tool Blue Book. We certainly enjoy reading your magazine and get many splendid ideas from it. Our Company has contacted many of the advertisers."

An Eastern Metal Fabricator says:

"We confirm our telegram requesting that you wire us name of a firm listed in your 'Plants for Subcontract Work' section. We have recently received a very substantial contract from the Ordnance Dept., and have considerable work to be handed out on a subcontract basis. Thanks very much for your effective cooperation."

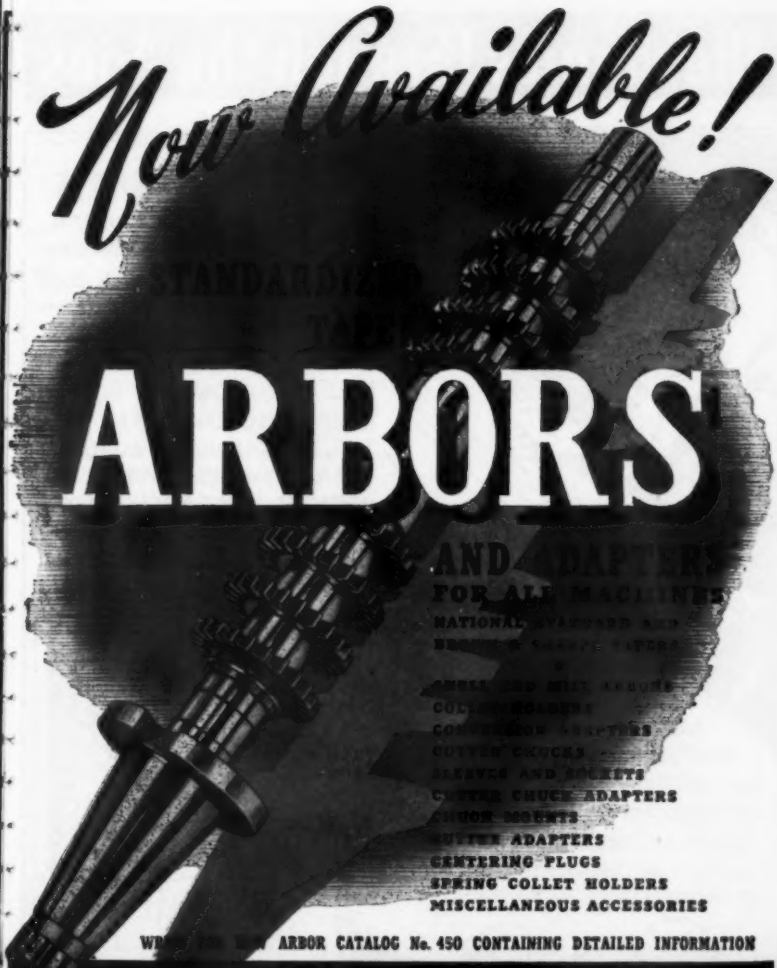
A Glider Builder writes:

"Our Shop Sup't., received a copy of your September Machine Tool Blue Book and in paging thru it I have found it exceptionally interesting. I was particularly impressed by the numerous advertisements indicating where various items of machine tools could be procured. I would certainly appreciate receiving the Blue Book regularly."

A Metal Products Corp., writes:

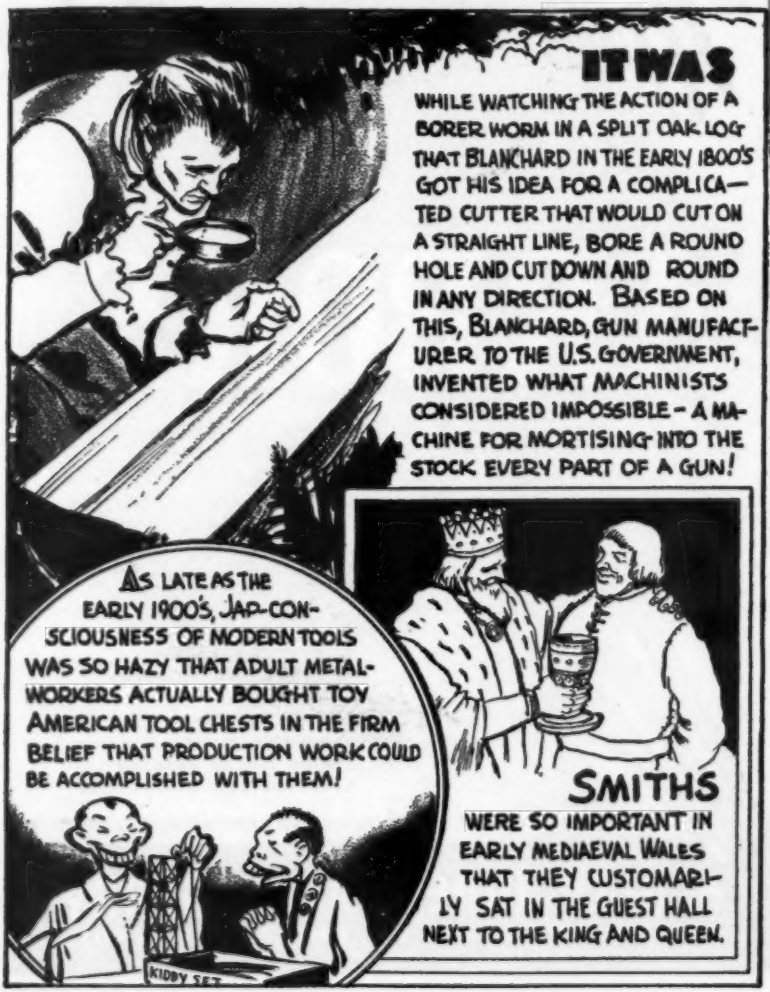
"In the September issue of The Machine Tool Blue Book is an article describing a Comparator designed by Brewster Aeronautical Corp., and used as an accessory to a Rockwell Hardness Tester.

"Since we are engaged in ordnance work and have trouble acquiring additional Rockwell machines, believe we could build a machine like you describe and speed up our production. If you can send us a further description of the device, or a sketch, it will be greatly appreciated and will help us in our war effort."



SCULLY-JONES AND COMPANY
1901 SO. ROCKWELL ST., CHICAGO, ILLINOIS

Mechanics Through the Ages

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Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

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Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

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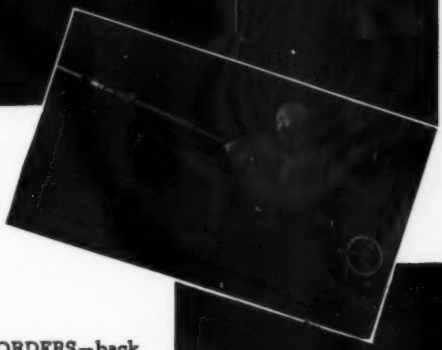

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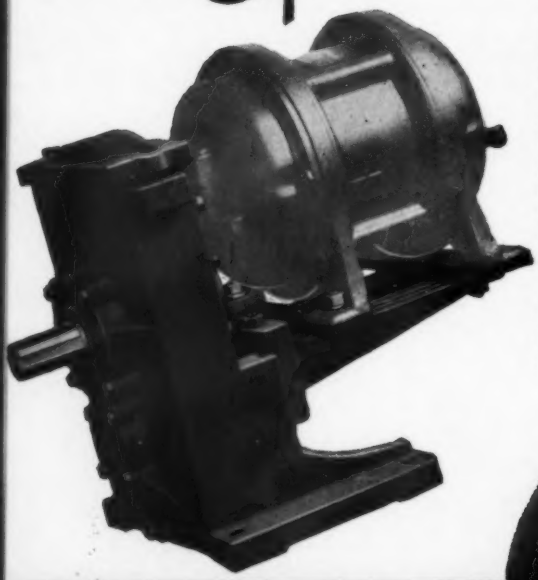

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